

**STATEWIDE FISHERIES SURVEYS, 2003
MANAGEMENT PLAN**

**South Dakota
Department of
Game, Fish and Parks
Wildlife Division
Joe Foss Building
Pierre, South Dakota 57501-3182**

**Annual Report
No. 04-21**

STATEWIDE FISHERIES SURVEYS, 2003

MANAGEMENT PLAN

SOUTH DAKOTA

ANNUAL REPORT

edited by
Dan R. Jost

Dingell-Johnson-----F-21-R-36
Job Number-----2101
Date-----December, 2004

John Cooper, Secretary
Department of Game, Fish and Parks

Wayne Winter
Grants Coordinator

Douglas Hansen
Wildlife Division Director

Dennis Unkenholz
Fisheries Staff Specialist

This is an annual report. Data from this report is not for publication and can only be used with written permission from the Secretary of the South Dakota Department of Game, Fish and Parks, Pierre, South Dakota 57501.

**Statewide Fisheries Surveys, 2003
Management Plan for Permanent and Semi-Permanent Waters**

South Dakota

By

Dan R. Jost

INTRODUCTION

Efforts were directed to review, update and analyze information pertinent to the character of selected South Dakota lakes.

Management plans for 21 waters are contained in this report.

ACCOMPLISHMENTS

Management Region I

Management plan updates were scheduled for 14 waters in Management Region I. Management Plans were written for 10 of the scheduled waters. Management Plans were not completed on four waters in Region I due to lack of data resultant from low water levels preventing surveys to be completed.

Management Region II

Management plans for 11 water were written as scheduled.

Management Region III

Management plans for 9 waters in Region III were scheduled but not completed due to lack of time. The waters scheduled under this segment will be rescheduled for completed during the next reporting period (F-21-R-37).

Management Region IV

Management plans in Region IV were not scheduled or completed due to a change in reporting format. Management recommendations and options are reported in the annual lake survey reports for these waters.

Reservoir Management

Management plans for Lake Oahe, Lake Sharp, Lake Francis Case, and Lake Lewis and Clark are written periodically as dictated by changes in management direction. Management plans for these waters are reported utilizing a separate format.

OBJECTIVES

To complete or update management plans and outline goals, objectives and strategies on South Dakota waters.

PROCEDURES

Reports and data from all available sources were analyzed to prepare a history of the past and present management of each body of water and current management plans were formulated. Various management actions are scheduled considering the development or changes in limnological and ecological structure of the lake. These actions may include manipulation of fish populations by stocking, harvest, or rehabilitation using population control practices and/or changes within the watershed, fishing regulations, access development, and lake basin modifications. The management plans include previously prepared information, data from periodic surveys, and changes in the ecological, limnological and population dynamics of the water.

Table of Contents

REGION I

Little White River Project, Bennett County.....	1
Belle Fourche Reservoir, Butte County.....	9
Stockade Lake, Custer County.....	17
Gardner Lake, Harding County.....	26
Curlew Lake, Meade County.....	33
Durkee Lake, Meade County.....	41
Newell Lake, Butte County.....	48
Wicksville Dam, Pennington County.....	55
East Lemmon Lake, Perkins County.....	60
Shadehill Reservoir, Perkins County.....	68

REGION II

Wanalain Lake, Brule County.....	77
Academy Lake, Charles Mix County.....	82
Lake Andes, Charles Mix County.....	86
Geddes Lake, Charles Mix County.....	92
Platte Lake, Charles mix County.....	96
Rosehill Lake, Hand County.....	101
Mission Lake, Hand County.....	106
Larson Dam, Lyman County.....	111
Hayes Lake, Stanley County.....	115
Cottonwood Lake, Sully County.....	120
Fuller Dam, Sully County.....	127
Lake Hiddenwood, Walworth County.....	130

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Little White River Project **County:** Bennett

Present Plan: F-21-R-36
Previous Plan: F-21-R-28

Date: Jan 1, 2004 to Dec 31, 2008
Date: Jan 1, 1995 to Dec 31, 1999

Surface Area: 167 acres
Maximum Depth: 9 feet

Management Class: WSP
Mean Depth: 4 feet

Legal Description: Township 37N, Range 36W, Sections 14, 23

MANAGEMENT GOAL

Optimize angling opportunities at the Little White River Project Reservoir.

OBJECTIVES AND STRATEGIES

- Objective 1.** Improve northern pike density to a CPUE of 5 or greater for stock-length northern pike.
- Strategy 1a. Evaluate the northern pike population by conducting lake surveys.
- Strategy 1b. If anecdotal evidence suggests harvest is limiting the northern pike population, then explore the use of a length limit and/or reduced daily limit.
- Strategy 1c. If necessary, stock small adult, juvenile or fingerling northern pike, depending on availability, to supplement the existing population.
- Objective 2.** Increase density of stock-length and larger black crappie to a trap net CPUE between 15 and 25, maintain PSD above or near 50 and RSD-9 greater than 10.
- Strategy 2a. Evaluate the black crappie population by conducting lake surveys.
- Strategy 2b. If necessary, stock adult black crappie to supplement the existing population.
- Strategy 2c. Explore adding brush structure around the reservoir to provide favorable cover and structure for the crappie.
- Objective 3.** Improve/maintain a high angler satisfaction.
- Strategy 3a. Use anecdotal information from the local conservation officer, refuge personnel and other professional staff to determine angler attitudes.
- Objective 4.** Keep the local conservation officer, other agencies and the public informed of fisheries management activities and solicit their input when planning changes in management objectives.
- Strategy 4a. Provide completed lake survey reports and management plans to other agencies and the public when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 5 years, or when special considerations require sampling, utilizing eight 24-hour frame net sets, two 150' experimental gill net sets and six 10 minute night time electrofishing stations.
2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
3. If drawdown occurs in 2005, then investigate potential habitat improvements (i.e. such as brush structure, deep pools, or silt traps) that could improve the fishery and restock with northern pike and adult black crappie.
4. If netting reveals northern pike CPUE less than stated objective values then stock small adult, juvenile or fingerling northern pike (in that order, depending on what is available) to supplement the population.
5. If anecdotal information indicates low angler satisfaction then re-evaluate angler attitudes towards the fishery and develop a management option that addresses angler wants.
6. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.

INVENTORY

The Little White River Project, also known locally as "Project", is a 200-acre reservoir located 12 miles southeast of Martin, or 2 miles west of Tuthill, in Bennett County. The reservoir was created in 1940 by the Works Progress Administration (WPA) and local contractors. The reservoir is located on the Little White River which flows into the White River.

The drainage basin for The Little White River Project is long and narrow. The basin total length is around 35 miles, average width is about 6 to 7 miles and total area of approximately 204 square miles. Seventy-five percent of the watershed is farmland and the remaining 25% is pasture and rangeland. Siltation is a problem and large amounts are deposited in the lake during heavy runoff into the White River north of the reservoir. The substrate throughout the reservoir is primarily silt and mud. Bulrush, cattail and willow are the primary emergent plant species around the lake and cover over 90% of the shoreline. Submerged vegetation is not a problem, most likely due to the turbidity of the water. The heavy runoff and siltation keeps the water murky through the summer months and little light penetration occurs.

A boat ramp, picnic area and swim area with a sand beach are located on the south east side of the lake. All of the facilities are located on land owned by the Fish and Wildlife Service and included in the LaCreek National Wildlife Refuge.

Ownership of Lake and Adjacent Lakeshore Properties:

The land surrounding the Little White River Project is owned by the South Dakota Department of Game, Fish and Parks and the United States Fish and Wildlife Service. The area is managed as a Game Production Area and a recreation area.

Fishery Management:

Records indicate early management of the reservoir's fishery was primarily accomplished by federal personnel. More recently management has been the responsibility of the South Dakota Game, Fish and Parks Department. Management activities at the reservoir have varied from the extreme (i.e. the lake has been drained five times since its construction and is potentially going to be drained again in 2005 during repair of the dam and spillway) to common practices, such as stocking. While a number of unrecorded stockings were made by refuge personnel in the past, the first fish stocking on record for the Little White River Project was of yellow perch in 1938. Since then, recorded stockings have included black bullhead, black crappie, bluegill, channel catfish, golden shiner, largemouth bass, northern pike, saugeye, and other shiner species.

An overabundant common carp population has been a recurring problem for the reservoir fishery. Chemical attempts (i.e. rotenone) have been tried to eliminate the carp but lack of success led to increased stockings of northern pike as a biological control.

Saugeye were first stocked in 1990 to establish an additional sportfish community in the reservoir. During the original saugeye stockings it was hoped the walleye-sauger cross would grow quickly with good survival. Success was extremely limited and probable reasons included the reservoir's small forage base and the sizes of stocked saugeye were small, late-spring fingerlings.

Characteristics of Fish Populations

The fishery at the Little White River Project was surveyed on June 16-17, 2003. Sampling consisted of two 150-foot experimental gill net nights and four ¼-inch trap net nights. Eight species of fish were collected throughout the survey. Results from the survey and comparisons to a 1995 survey at the lake are included in the following tables and text.

Table 1. Stocking record for the Little White River Project, 1990-2003.

Year	Species	Number	Size
1990	Saugeye	20,000	Fingerling
1991	Saugeye	7	Adult
	Saugeye	10,000	Fingerling
	Northern pike	12	Adult
1993	Saugeye	20,000	Fingerling
1994	Saugeye	20,000	Fingerling
1995	Saugeye	18,446	Fingerling
1996	Saugeye	20,000	Fingerling
1997	Saugeye	20,000	Fingerling
1998	Saugeye	20,000	Fingerling
2001	Saugeye	25,000	Fingerling
2002	Walleye	22,989	Fingerling
2003	Walleye	20,540	Fingerling

Table 2. Catch data for all fish species collected from four, ¼ inch frame nets in the Little White River Project, June 16-17, 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	92	23.0 (21.4)	--	13 (8)	0	80.6 (0.5)
Black crappie	30	7.5 (11.2)	7.5 (11.2)	77 (14)	20 (13)	100.8 (1.0)
Channel catfish	7	1.8 (1.7)	1.0 (0.9)	0	0	88.3 (7.5)
Common carp	112	28.0 (35.3)	--	23 (10)	15 (9)	78.0 (1.2)
Northern pike	7	1.8 (1.2)	1.8 (1.2)	14 (28)	0	83.1 (9.3)
Tadpole madtom	1	0.3 (0.4)	--	--	--	--
Walleye	2	0.5 (0.8)	0.3 (0.4)	--	--	78.8 (-)

Table 3. Catch data for all fish species collected from two 150-ft experimental sinking gill nets, Little White River Project, June 16-17, 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr-S
Black bullhead	2	1.0 (3.1)	0.0 (--)	--	--	--
Common carp	19	9.5 (4.6)	--	23 (11)	15 (9)	74.3 (2.8)
Northern pike	1	0.5 (1.5)	0.5 (1.5)	--	--	85.9
Walleye	9	4.5 (1.5)	0.0 (--)	0 (--)	0 (--)	--
Yellow perch	1	0.5 (1.5)	0.5 (1.5)	--	--	89.9

Black Bullhead

The Little White River Project has a moderately abundant black bullhead population which has increased in density since the last survey. Frame net CPUE in 2003 was 23.0, compared to 6.1 in 1995. Low values for stock density indices (PSD = 13, RSD-P = 0; Table 2) and the length frequency histogram (Figure 1) both show a population dominated by small fish. In addition, mean condition was poor with a Wr for stock-length and larger bullheads of 80.6.

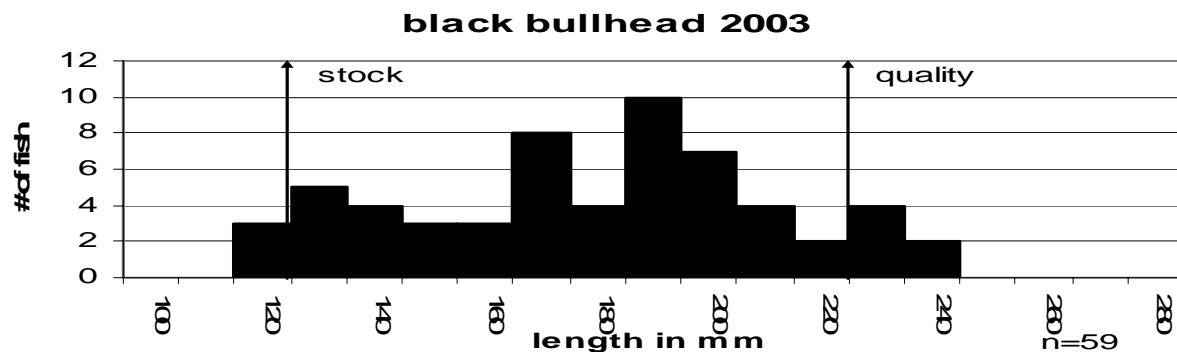


Figure 1. Length frequency histogram for black bullhead from frame nets at Little White River Project.

Black Crappie

Black crappie were the dominate panfish in Little White River Project in both 1995 and 2003. Frame net CPUE was 7.5 in 1995 and 2003. Stock indices and length frequency show a high percentage of larger fish in the population (Table 2, Figure 2). The 2003 PSD was 77, the RSD-P was 20, and the population even had an RSD-M of 13. Fish condition was excellent with a Wr of stock length and larger fish of 100.8. Growth was extremely fast with an average three year old measuring 10 inches (Table 4).

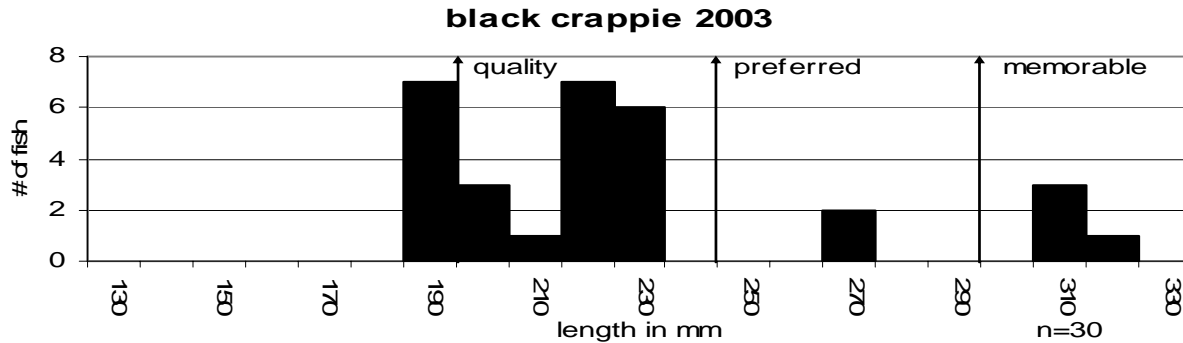


Figure 2. Length frequency histogram for black crappie from frame nets at Little White River Project.

Table 4. Little White River Project black crappie year class, age and growth data from 2003, the mean lengths in 1995, and the statewide black crappie mean length-at-age values (Willis et al. 2001).

Year Class	Age	N	1	2	3	4	5
2001	2	22	117	209			
2000	3	2	115	228	267		
1999	4	3	98	211	263	299	
1998	5	1	83	196	232	265	299
Sample size		28					
2003 Mean (SE)			103 (8)	211 (7)	254 (11)	282 (17)	299 (0)
1995 Mean		34	75	144	190	217	
South Dakota (SE)			83 (2)	147 (4)	195 (5)	229 (6)	249 (6)

Common Carp

The common carp density has increased and carp was the most abundant species sampled during the 2003 survey. Frame net CPUE in 2003 was 28.0 and gill net CPUE was 9.5 (Tables 2 and 3), compared to 0.9 and 0.0, respectively, in 1995. Length frequency showed many different sizes of carp indicating excellent recruitment, which could pose a problem in the future (Figure 3).

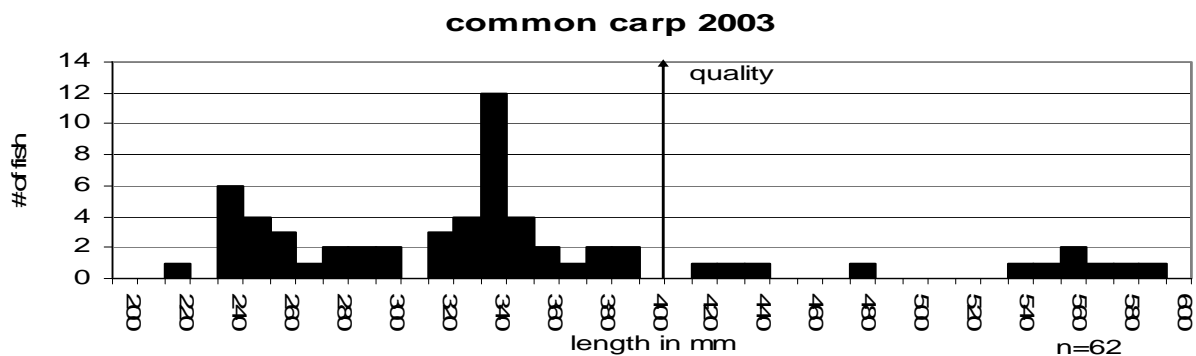


Figure 3. Length frequency histogram for common carp from frame nets at Little White River Project.

Northern Pike

Pike density was low in 1995 and continues to be low with 2003 CPUE of 0.5 in gill nets and 1.8 in frame nets (Tables 2 and 3). Only two of the eight northern pike sampled were over the quality-length of 21 inches. Although small carp and bullheads are present, mean condition was poor with a Wr for stock-length and larger fish of 83.1 (Table 2).

Walleye/Saugeye

In the past ten years, 187,000 walleye/saugeye have been stocked at LWRP. Obviously this is not creating much of a fishery as the largest fish sampled was 10 inches (Figure 4). Gill net CPUE was 4.5, none of which were over stock-length (10-inches). Condition was also poor as substock fish had a mean Wr of 82.3. Walleye/saugeye fingerlings have been stocked nine out of the last eleven years. With no apparent stockings recruited to the population, it appears time to discontinue stocking small walleye fingerlings and concentrate on another game fish.

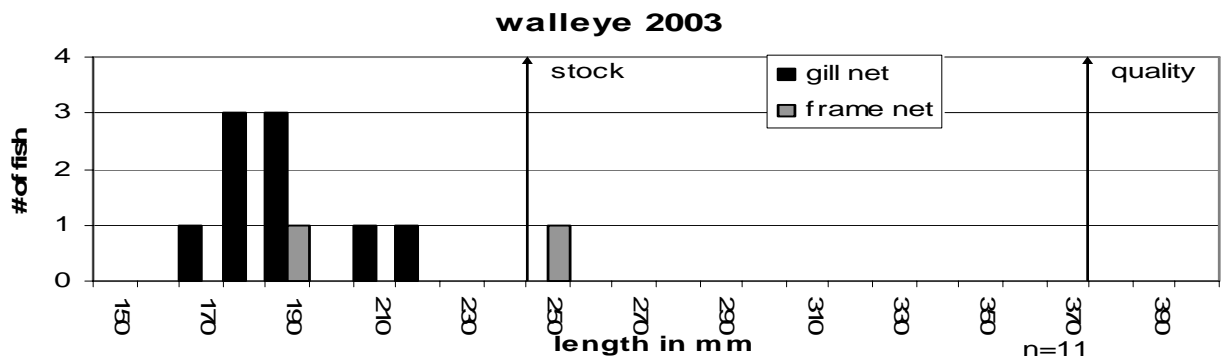


Figure 4. Length frequency histogram for walleye from gill nets and frame nets at Little White River Project.

LITERATURE CITED

- Francis, J. 1999. Winfin, Version 2.95; Microsoft Access Program for data entry. Nebraska Game and Parks Commission, Lincoln.
- Francis, J. 2000. WinFin Analysis Program. Version 1.5. Nebraska Game and Parks Commission, Lincoln.
- Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.
-

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Belle Fourche Reservoir

County: Butte

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 8000 acres

Management Class: WWP

Maximum Depth: 55 feet

Mean Depth: 25 feet

Legal Description: T 9N, R 3E, Sec. 1-3, 7, 11-14, 19, 23-26, 29

MANAGEMENT GOAL

To optimize angling opportunities at the Belle Fourche Reservoir.

OBJECTIVES AND STRATEGIES

Objective 1. To maintain a walleye fishery with a minimum gill-net CPUE for stock-length walleye of 20, a PSD range of 30-60, increase RSD-P to 10 or greater, and maintain a mean growth rate of no less than 35.5 cm (14 in) at age-3.

Strategy 1a. Evaluate the walleye population and walleye length limits by conducting lake surveys. If the 14-inch minimum and 1 over 20 daily limit appears unable to meet criteria in Objective 1 then explore other possible regulations (i.e. protected length group with one large fish, etc).

Strategy 1b. Stock walleye fingerlings into voids of natural reproduction or when supplementing the population is needed.

Objective 2. To maintain or supplement the gizzard shad population through adult stockings.

Strategy 2a. Evaluate adult gizzard shad over-winter survival through trap net and gill net catch during annual lake surveys.

Strategy 2b. Stock 100 to 200 adult gizzard shad annually to supplement the existing population until it is determined if the population can sustain itself in mild winter years.

Objective 3. To maintain a unique tigersmuskie population within the reservoir through stockings of advanced fingerlings.

Strategy 3a. Evaluate the tigersmuskie population through standard population surveys, creel surveys, and anecdotal catch information from local WCO's and anglers.

Objective 4. Maintain an angler satisfaction rate at 73% or greater. Gigliotti (2000) reported a statewide angler satisfaction level for SD resident and non-resident anglers of 73.4 % in 1999.

Strategy 4a. Conduct a roving creel survey every 5 to 10 years to determine angler satisfaction and attitudes, and catch and harvest rates.

Objective 5. Keep the Butte County Conservation Officer, the Bureau of Reclamation, and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Strategy 5a. Provide lake survey reports, creel reports, and management plans when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys annually utilizing twelve 24-hour frame net sets, a minimum of two 300-foot experimental gill net sets and four seining stations of two to four pulls per station.
2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
3. If netting reveals walleye CPUE less than the stated objective values then stock 200,000 to 250,000 small fingerlings (or numbers as available) to supplement the population.
4. If angler satisfaction rates drop substantially below 73%, re-evaluate angler attitudes towards the fishery and develop a management option that addresses angler wants.
5. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.

INVENTORY

Belle Fourche Reservoir, also know as Orman and Orman Dam, has a surface area of approximately 8,040 acres when full and volume capacity of 192,077 acre feet. The reservoir is formed by Belle Fourche Dam on Owl Creek, a tributary of the Belle Fourche River. The reservoir is an irrigation source for approximately 57,000 acres and irrigation often draws the reservoir down to extremely low levels in the fall. Refilling is accomplished by diverting water from the Belle Fourche River through the Inlet Canal. Supplemental storage of water is facilitated by Keyhole Reservoir in northeastern Wyoming.

The watershed is approximately 4,480 square miles consisting mostly of privately owned pasture land used for livestock grazing. The U.S. Bureau of Reclamation (BOR) and the Belle Fourche Irrigation District perform operation and maintenance of the dam. The South Dakota Department of Game, Fish and Parks Division of Wildlife manages 164 acres below the dam grade and the Division of Parks manages 350 acres around the boat ramp (T9N R3E, Sec. 24, 25). The BOR manages 6,617 acres around the reservoir as wildlife habitat and for public access.

Shoreline vegetation is limited to nonexistent due to water level fluctuations and wave action. During spring months as the reservoir is refilling, existing vegetation within the periphery of the reservoir is flooded and fisheries reproduction can be high if drawdowns don't occur until after fish have spawned and young have hatched. Summer and Fall

months are characteristic of dropping water levels with muddy shorelines and little or no submerged or shoreline vegetation.

Developments at the reservoir are limited. Currently there are a total of 6 outhouses around the reservoir, and one boat ramp with 2 docks and gravel parking lot on the west side of the reservoir. Access to the reservoir has become a problem due to road maintenance. A single gravel road, approximately 3½ miles long, is the only access to the boat ramp. High use at the reservoir and length of the gravel road requires substantial maintenance.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

The Belle Fourche Reservoir is owned by the Bureau of Reclamation. Approximately 6,473 acres of federal land surround the reservoir. The Game, Fish and Parks Department manages 359 acres on Rocky Point for recreation and 164 acres on Owl Creek below the dam for wildlife purposes. SDGFP constructed roads to Gaden's Point and Rocky Point on the western side of the reservoir and Golf Course Point on the eastern side in the early 1970's. In addition, SDGFP installed vault toilets and boat ramps at Gaden's and Rocky Points.

Fishery Management:

Management of the Belle Fourche Reservoir fishery has been, and continues to be, primarily as a walleye fishery. Beginning in January 2003, a daily limit of only one walleye over 20-inches was added to the 14-inch minimum-length-limit. It is hoped the restriction on larger walleye will distribute these fish among anglers, as well as, impress the value of larger walleye to the anglers and promote higher release rates.

Since construction of the lake, stockings (Table 1) have been the primary fisheries management tool in the reservoir. Recent fisheries management has included stockings of tiger muskie to create a unique sport fishery in western South Dakota. Stockings began in 1985 with small fingerlings. Density has remained extremely low and currently, larger age-1 (juvenile) tiger muskie are stocked in order to improve survival into the adult population. Gizzard shad were reintroduced to the reservoir in 1997 in an attempt to provide a reservoir-wide forage base. Depending on availability, between 100 and 200 prespawn shad are stocked annually to supplement the adult population.

Fish Population Characteristics:

Seining was completed at the Belle Fourche Reservoir on July 16th, 2003 and a netting survey of the fish population was conducted from August 25 to the 27th, 2003. Seining consisted of 4 stations with 2 hauls per station. The netting survey consisted of 2 gill net nights and 8 trap net nights. Nine species of fish were collected during seining and eleven species were collected during the netting survey. The results are included in the following tables and text.

Table 1. Stocking record for the Belle Fourche Reservoir, 1995-2003.

Year	Species	Number	Size
1995	Brown trout	5,500	Fingerling
	Tiger muskie	25,400	Fingerling
	Walleye	253,440	Fingerling
1996	Rainbow trout	7,414	Fingerling
	Tiger muskie	25,000	Fingerling
1997	Gizzard shad	95	Adult
	Rainbow trout	1,969	Catchable
	Walleye	239,503	Fingerling
1998	Gizzard shad	516	Adult
	Rainbow trout (S)	22,819	Fingerling
	Tiger muskie	37,130	Fingerling
	Walleye	250,000	Fingerling
1999	Gizzard shad	522	Adult
	Muskellunge	640	Large fingerling
	Tiger muskie	2,000	Large fingerling
2000	Gizzard shad	493	Adult
	Rainbow trout (C)	14,867	Fingerling
	Rainbow trout (M)	39,162	Fingerling
	Rainbow trout (S)	40,000	Fingerling
	Tiger muskie	2,600	Large fingerling
2001	Gizzard shad	48	Adult
	Tiger muskie	1,900	Large fingerling
2002	Tiger muskie	2,000	Large fingerling
	Gizzard shad	23	Adult
2003	Walleye	171,893	Fingerling
	Rainbow trout	18,436	Fingerling
	Tiger muskie	1,500	Large fingerling
	Gizzard shad	102	Adult

Table 2. Catch data (CPUE's with 80%CI's in parentheses; PSD, RSD-P with 90%CI's; mean Wr-S with 80%CI's) for all fish species collected from eight ¾-inch trap nets in Belle Fourche Reservoir, August 25-27, 2003.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black crappie	44	5.5(4.8)	5.5(4.8)	100(--)	93(6)	105.2(0.5)
Channel catfish	1	0.1(0.2)	0.1(0.2)	--	--	--
Common carp	1	0.1(0.2)	0.1(0.2)	--	--	--

River carpsucker	3	0.4 (0.4)	0.4 (0.4)	--	--	--
Shorthead redhorse	10	1.3 (0.7)	1.3 (0.7)	--	--	--
Smallmouth bass	5	0.6 (0.5)	0.6 (0.5)	--	--	95.7 (17.9)
Walleye	25	3.1 (1.9)	2.4 (1.6)	37 (20)	11 (12)	--
White bass	76	9.5 (8.7)	0.0 (--)	0 (--)	0 (--)	--
Yellow perch	4	0.5 (0.5)	0.5 (0.5)	--	--	--
Total	169					

Table 3. Catch data (CPUE's with 80%CI's in parentheses; PSD, RSD-P with 90%CI's; mean Wr-S with 80%CI's) for all fish species collected from two, 300-ft experimental sinking gill nets in the Belle Fourche Reservoir, Butte County, August 25-27, 2003.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black crappie	1	0.5 (1.5)	0.5 (1.5)	--	--	101.8 (--)
Channel catfish	22	11.0 (12.3)	6.5 (7.7)	46 (26)	8 (13)	82.1 (4.5)
Common carp	4	2.0 (0.0)	2.0 (0.0)	--	--	--
Gizzard shad	138	69.0 (67.7)	4.0 (9.2)	100 (--)	--	109.0 (3.9)
River carpsucker	3	1.5 (1.5)	1.5 (1.5)	--	--	--
Shorthead redhorse	2	1.0 (3.1)	1.0 (3.1)	--	--	--
Spottail shiner	2	1.0 (3.1)	1.0 (3.1)	--	--	--
Walleye	317	158.5 (297.0)	125 (255.5)	29 (5)	1 (1)	85.6 (0.1)
White bass	9	4.5 (10.8)	1.0 (3.1)	100 (--)	50 (50)	101.8 (27.2)
Yellow perch	17	8.5 (13.9)	3.5 (1.5)	86 (28)	14 (28)	82.0 (5.1)
Total	37					

Black crappies

Black crappies were the most numerous species collected in trap nets, but were still relatively low in abundance with a CPUE of 5.5. Low water made finding suitable trap net sites hard, and may have affected catch rates. The forty-four fish sample yielded a PSD of 100 with an RSD-P of 93. Fish condition was excellent with a mean Wr for stock length and larger fish of 105.2. Last year CPUE was 2.5 with a PSD of 95 and an RSD-P of 23.

Table 4. Composite listing of catch data from trap nets for black crappie from the Belle Fourche Reservoir, 2000-2003.

Year	N	CPUE	PSD	RSD-P
2000	81	8.2 (6.9)	44 (10)	33 (10)
2001	47	5.9 (3.0)	87 (8)	9 (7)
2002	22	2.8 (1.9)	95 (7)	23 (16)
2003	44	5.5 (4.8)	100 (--)	93 (7)

Channel Catfish

Channel catfish were the third most abundant species in the gill net sample with a CPUE of 11.0 (Table 5). Stock indices were similar to years past

with a PSD of 51 and an RSD-P of 2. RSD-P remained low and condition was low with a mean Wr for stock-length and larger catfish of 82.1 (Table 2). Fish ranged in size from 200-mm to 710-mm.

Table 5. Composite listing of annual gill net sample data for channel catfish from the Belle Fourche Reservoir, Butte County, 1999-2003.

Year	N	CPUE	PSD	RSD-P
1999	34	5.7 (2.0)	78 (12)	0 (NA)
2000	54	13.5 (9.9)	69 (12)	2 (4)
2001	107	26.8 (10.3)	56 (8)	3 (3)
2002	45	22.5 (41.6)	51 (2)	2 (4)
2003	22	11.0 (12.3)	46 (26)	8 (13)

Walleye

Walleye abundance continues to increase with a gill net CPUE of 158.5 (Table 6). Similar to previous years, stock density indices were low with a PSD of 29 and an RSD-P of 1. A one over 20-inch rule was added to the existing 14-inch minimum. It is doubtful this will have much effect since gill net samples indicate only a small portion of the population is making it over 20 inches. Hopefully it will place a higher value on larger walleye and spread catch of larger walleye to other anglers or throughout the year. During seining, 44 young of the year walleye were sampled, and 63 were sampled in the gill nets.

Growth rates are slightly faster than the regional mean and mean condition remains rather low for Belle Fourche Reservoir (Tables 7 and 8). The lack of age-1 fish during sampling is concerning. This could be due to suppression by the strong 2000 and 2001 year classes. Hopefully, natural reproduction and the stocking in 2003 will aid in maintaining a balance to the age structure of the population. From the 2002 and 2003 length frequencies, the lack of age-1's might be explained by poor sampling for this age group. The 2001 class did not appear in gill net catch during 2002 but were very strong in 2003 (Figure 2).

Table 6. Composite listing of annual gill net data for walleye collected by gill net in the Belle Fourche Reservoir, Butte County, 1998-2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P
1998	87	9.6		2	0
1999	133	22.2		21 (6)	0
2000	109	27.3 (17.6)	22.3 (11.1)	65 (9)	0 (NA)
2001	283	70.8 (33.2)	63.8 (31.3)	47 (5)	4 (2)
2002	178	89.0 (40.0)	87.5 (41.6)	38 (6)	3 (2)
2003	317	158.5 (297.0)	125.0 (255.5)	29 (5)	1 (1)

Table 7. Mean condition (Wr) for gill netted walleye from the Belle Fourche Reservoir, Butte County, 2000-2003.

Length Category	2000	2001	2002	2003
Substock	96.8 (7.9)	95.5 (1.0)	82.5 (1.2)	84.6 (2.8)
Stock to quality	84.4 (1.0)	88.0 (0.4)	87.3 (0.2)	87.3 (0.1)
Quality to preferred	83.8 (0.4)	84.5 (0.2)	80.4 (0.4)	81.8 (0.1)

Table 8. Belle Fourche Reservoir walleye age data and Region 1 and South Dakota walleye mean length-at-ages (Willis et al. 2001).

Year Class	Age	N	1	2	3	4	5	6	7
2002	1	8	164						
2001	2	27	169	263					
2000	3	30	163	284	351				
1999	4	16	149	281	376	422			
1998	5	7	158	273	352	410	445		
1997	6	6	153	279	334	383	433	457	
1996	7	4	138	277	322	353	403	447	473
Mean (SE)		98	156 (4)	276 (3)	347 (9)	392 (15)	427 (13)	452 (5)	473 (0)
Region 1			164 (17)	260 (22)	332 (27)	385 (32)	444 (42)		
S.D. Mean			168 (3)	279 (6)	360 (7)	425 (8)	490 (9)		

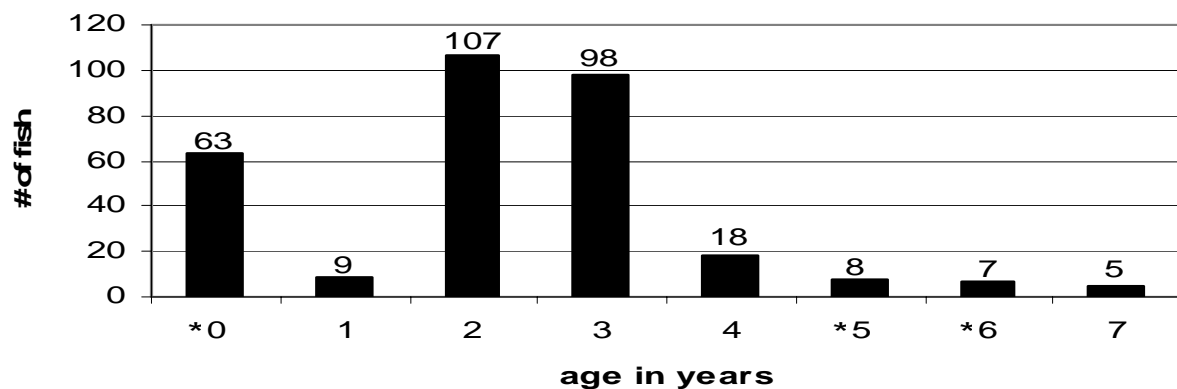


Figure 1. Age frequency histogram of walleye collected by gill net in Orman Reservoir, 2003. An "*" indicates years when walleye were stocked.

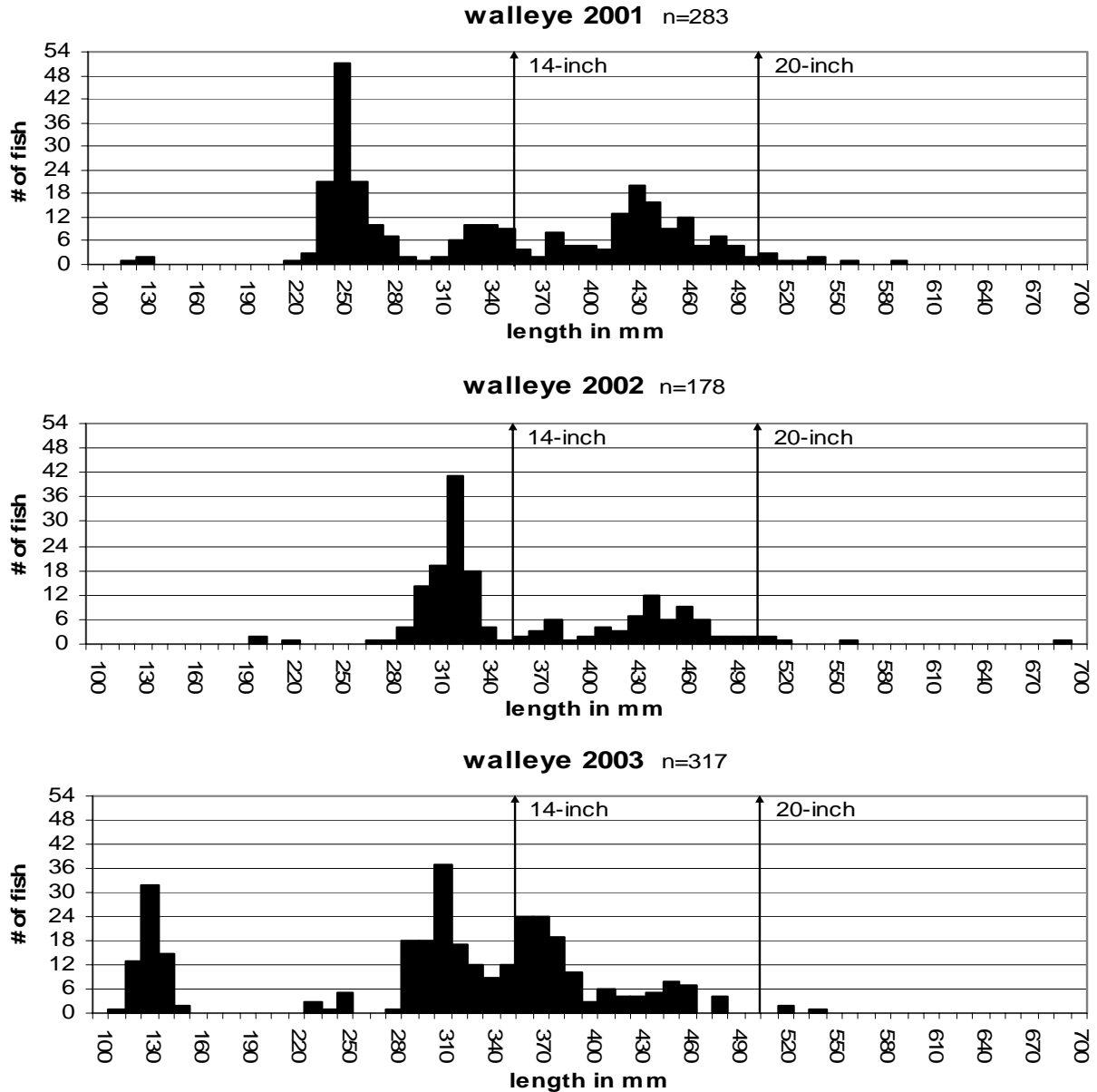


Figure 2. Length frequency histogram for walleye from gill nets, Belle Fourche Reservoir, 2000-2003.

LITERATURE CITED

Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Stockade Lake

County: Custer

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 130 acres

Management Class: WWP

Maximum Depth: 45 feet

Mean Depth: 15.8 feet

Legal Description: Township 3S, Range 5E, Sections 21, 22, 27, 28

MANAGEMENT GOAL

To optimize angling opportunities at Stockade Lake with emphasis on the panfish fisheries.

OBJECTIVES AND STRATEGIES

Objective 1. To maintain a trap-net CPUE value for stock-length black crappies greater than 10, maintain crappie PSD greater than 20 and RSD-P greater than 5, and growth rates at or near the regional average.

Strategy 1a. Annually evaluate the black crappie population by conducting a standard population survey to determine density, population size structure, growth and condition.

Strategy 1b. Maintain predator densities (i.e. largemouth bass, smallmouth bass and brown trout) at levels that, in addition to harvest, will effectively maintain crappie population values within objective ranges.

Objective 2. To maintain a gill-net CPUE value for stock-length yellow perch greater than 10, maintain PSD between 30 and 50, RSD-P greater than 5, and growth at or near the regional average.

Strategy 2a. Annually evaluate the yellow perch population by conducting a standard population survey to determine density, population size structure, growth and condition.

Strategy 2b. Maintain predator densities at levels that, in addition to harvest, will effectively maintain yellow perch population values within objective ranges.

- Objective 3.** To achieve and maintain a largemouth bass fishery with a minimum night-time electrofishing CPUE for stock-length fish of 20, a PSD range between 20 and 40, RSD-P between 0 and 10.
- Strategy 3a. Evaluate the largemouth bass population and 15-inch minimum-length-limit regulation by conducting nighttime electrofishing surveys.
- Strategy 3b. Stock adult bass to supplement the existing population when nighttime electrofishing CPUE of stock-length largemouth bass is below 20.
- Objective 4.** To develop and maintain a low density trophy brown trout fishery that generates anecdotal report rates of trophy brown trout (20 inches or 5 lbs.) at 3 to 10 per year the third year after initial stocking.
- Strategy 4a. Stock brown trout at a rate of 25 catchables (10 to 11 inches in length) per surface acre the first 2 consecutive springs and then every other year.
- Strategy 4b. Determine from creel surveys the harvest rates of the stocked brown trout.
- Objective 5.** Maintain an angler satisfaction rate at 73% or greater. Gigliotti (2000) reported a statewide angler satisfaction level for SD resident and non-resident anglers of 73.4 % in 1999.
- Strategy 5a. Conduct a roving creel survey every 5 to 10 years to determine angler satisfaction, attitudes, and catch and harvest rates.
- Objective 6.** Keep the Custer County Conservation Officer, Custer State Park personnel and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.
- Strategy 6a. Provide lake survey reports, creel reports, and management plans when requested.
-

5 YEAR OPERATIONAL PLAN

1. Conduct annual fisheries population surveys annually utilizing eight 24-hour frame-net sets, three 150' experimental gill net sets and six 10 minute nighttime electrofishing stations.
2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.

3. If night electrofishing reveals largemouth bass population values other than the stated objective values then re-evaluate the 15-inch minimum length limit. If needed, stock adult largemouth bass at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the population until an appropriate harvest is accomplished through regulations.
 4. If no anecdotal reports of trophy brown trout are reported and brown trout are not observed during netting and electrofishing within 5 years, reevaluate the brown trout stockings with the possibility of discontinuing.
 5. If angler satisfaction rates drop substantially below 73%, re-evaluate angler attitudes towards the fishery and develop a management option that addresses angler wants.
 6. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.
-

INVENTORY

Stockade is a 130-acre impoundment located on French Creek in Custer County, 3 miles east of Custer, SD. Primary uses of the Stockade Lake watershed are timber sales (60%) administered by the U.S. Forest Service (USFS), grazing (20%), municipal water use (15%), and mining (5%). Cattle grazing has occurred on private land and USFS land surrounding the lake. Bismarck Lake has a surface area of 25 acres and drains into one of Stockade Lake's north bays. Custer Municipal Pond has an estimated surface area of 4 acres and is located on French Creek above Stockade Lake on the west edge of Custer.

Developments at the lake include: boat ramp, gravel parking lot and picnic area with vault toilets on the east side; a reserved group campground and the South Campground on the south side of the lake; and the North Campground and a day use area with paved road and fishing pier on the north side.

Aquatic vegetation mostly consists of cattails and pondweed. Stands of cattail are prevalent along shorelines with shallow areas and in bays. Submerged vegetation consists mostly of pondweed in shallow, shoreline areas. Summer algae blooms have sometimes been heavy and contributed to past summer kills.

Siltation and nutrient loading into Stockade Lake has become a problem. Siltation occurs from highway runoff, grazing, mining, and forestry practices via French Creek and Bismarck Lake Creek. From 1987 to 1990, silt removal from the French Creek inlet was accomplished by dredging and construction equipment (i.e. loaders and dump trucks). Excessive nutrient loading from waste water was also a problem in the past. The sewage treatment facility for the city of Custer was upgraded over the years, so city waste no longer enters the lake.

The water level control valve was repaired in either 1989 or 1990. An aeration system was installed in the fall of 1998. The three small air pumps (one ½-Hp and two 1-Hp Thomas pumps) of the original aeration system failed during the summer of 2000. A new generator (5-Hp Quincy) was installed during late summer of 2000 to replace the original pumps and no problems have been identified since.

The aeration system is operated through most of the ice-free months (mid-May to mid-October) except during 2000 when the system was only operational from May to the first week of July due to pump failure. Lake chemistry was

conducted twice a month during the summer of 2001. In 2002, lake chemistry was conducted once a month. Lake chemistry was conducted in order to determine what effect the aeration system had on water characteristics in the lake. It was anticipated that aeration would decrease summer stratification so that deeper waters in the lake would become more habitable for fish and also that increased fish growth would be observed.

Ownership of Lake and Adjacent Lakeshore Properties:

Stockade Lake is within the boundaries of Custer State Park and all facilities are managed by the Parks Division of the Department of Game, Fish and Parks. The shoreline is primarily managed as a recreational area and the lake is accessible around it's entire periphery.

Fishery Management:

Past management of Stockade Lake has been for trout. Although excess rainbow trout are still stocked into Stockade, current management efforts are focused on warm water species such as largemouth and smallmouth bass, black crappie and yellow perch. The 15-inch minimum-length-limit on largemouth bass was expanded in January 2004 to include smallmouth bass also.

Since construction of the lake, stockings (Table 1) have been the primary fisheries management tool in the reservoir. As mentioned, excess rainbow trout are stocked nearly every year. Smallmouth bass were last stocked in 1993 and adult largemouth bass were moved into Stockade from Legion Lake in 2003 to supplement the population.

Species of fish currently present in the reservoir are: black bullhead, black crappie, largemouth bass, northern pike, rainbow trout, smallmouth bass, white sucker, and yellow perch.

Fish Population Characteristics:

Netting and night electrofishing surveys are accomplished annually at Stockade Lake. The netting survey generally consisted of 3 gill net nights and 8 trap net nights. Night electrofishing is normally 7 10 minute stations. Results from the 2003 survey and previous surveys are discussed in the following tables, figures, and text.

Table 1. Stocking record for Stockade Lake, Custer County, 1990-2003.

Species	Year	Number	Size
Cutthroat trout	1991	17,707	medium fingerling
(Kamloop strain) (Kamloop strain) (Growth strain)	1990	83,022	fingerling
	1991	82,557	medium fingerling
		150	large fingerling
	1992	14,525	medium fingerling
		78,975	small fingerling
	1993	70,000	medium fingerling
	1994	70,000	medium fingerling
	1995	70,000	fingerling
	1996	70,000	fingerling (200/kg)
	1997	70,000	fingerling (200/kg)
	1998	67,700	fingerling
		70	adult
	1999	77,580	fingerling
	2000	10	adult
	2001	69,844	fingerling
	2002	30,000	fingerling
		1,194	catchable
	2003	50	adult
Smallmouth bass	1990	14,750	fingerling
	1991	13,000	medium fingerling
	1992	13,000	medium fingerling
	1993	13,000	medium fingerling
Largemouth bass	2003	409	adult

Table 2. Total catch for three 150-ft. experimental sinking gill nets on Stockade Lake, Custer County, South Dakota from 8-10 September 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
Yellow perch	79	26.3 (7.4)	25.3 (6.4)	51 (10)	0	89.1 (0.6)
Black crappie	4	1.3 (1.3)	1.3 (1.3)	0	0	105.8 (4.5)
Largemouth bass	1	0.3 (0.7)	0.3 (0.7)	100	0	99.2
Smallmouth bass	6	2.0 (1.1)	2.0 (1.1)	100 (0)	83 (17)	93.0 (2.4)
Walleye	1	0.3 (0.7)	0.3 (0.7)	100	100	99.6
Northern pike	4	1.3 (1.3)	1.3 (1.3)	25 (59)	0	89.2 (10)
White sucker	32	10.7 (5.4)	10.7 (5.4)	100 (0)	100 (0)	99.2 (0.7)
Total	127					

Table 3. Total catch of 8 overnight frame nets on Stockade Lake, Custer County, South Dakota from 8-10 September 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	WR•S
Smallmouth bass	4	0.5 (0.5)	0.5 (0.5)	75 (25)	0	82.2 (18.0)
Northern pike	16	2.0 (0.8)	1.9 (0.8)	13 (16)	7 (11)	85.5 (2.3)
Yellow perch	74	9.3 (5.6)	9.3 (5.6)	69 (9)	5 (5)	91.7 (0.4)
Black crappie	52	6.5 (3.3)	6.4 (3.2)	94 (6)	0	102.1 (0.3)
Black bullhead	6	0.8 (0.7)	0.8 (0.7)	100 (0)	83 (17)	93.6 (10.5)
White sucker	126	15.8 (11.6)	15.8 (11.6)	100 (0)	100 (0)	93.6 (2.8)
Largemouth bass	4	0.5 (0.4)	0.3 (0.2)	50 (50)	0	91.7 (31.0)
<i>Total</i>	<i>282</i>					

Table 4. Total catch of 7 ten-minute night electrofishing passes on Stockade Lake, Custer County, South Dakota 9 September 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
Largemouth bass	96	82.3 (30.8)	58.3 (23.3)	71 (9)	3 (3)	101.9 (0.8)
Smallmouth bass	12	10.3 (7.2)	8.6 (5.3)	10 (18)	10 (18)	89.7 (3.6)
<i>Total</i>	<i>108</i>					

Black crappie

Although RSD-P has remained at 0 for the past 3 years, PSD values increased again in 2003 and overall size structure has been increasing slightly relative to the past few years (Figures 1 and 2). In short, more crappie appear to be surpassing quality length (200 mm; Figure 2). In addition, condition has been excellent with mean Wr values of stock-length and larger crappie above 100. Growth for black crappie in Stockade Lake has been comparable with other waters in Region 1 and crappie are reaching quality length (200 mm) at 4 years of age. Overall, the crappie population appears to be increasing in size and fish condition has remained excellent.

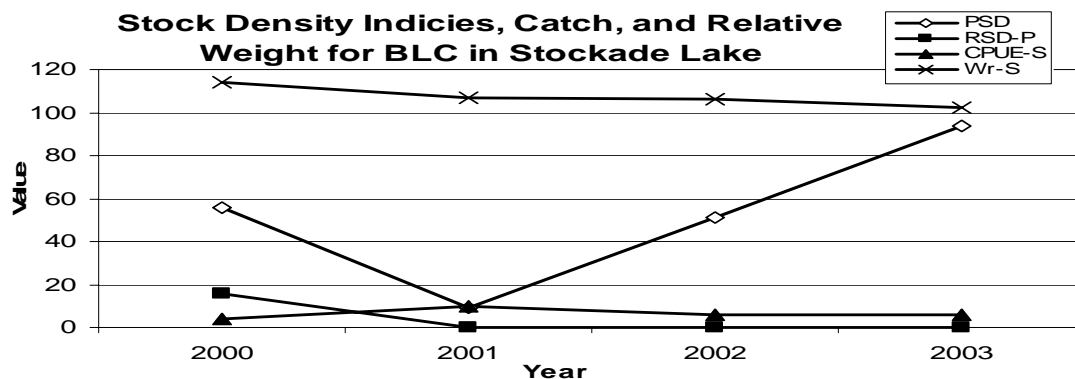


Figure 1. Stock density indices, catch per unit effort, and relative weights for black crappie captured in trap nets at Stockade Lake, Custer County, South Dakota from 2000-2003.

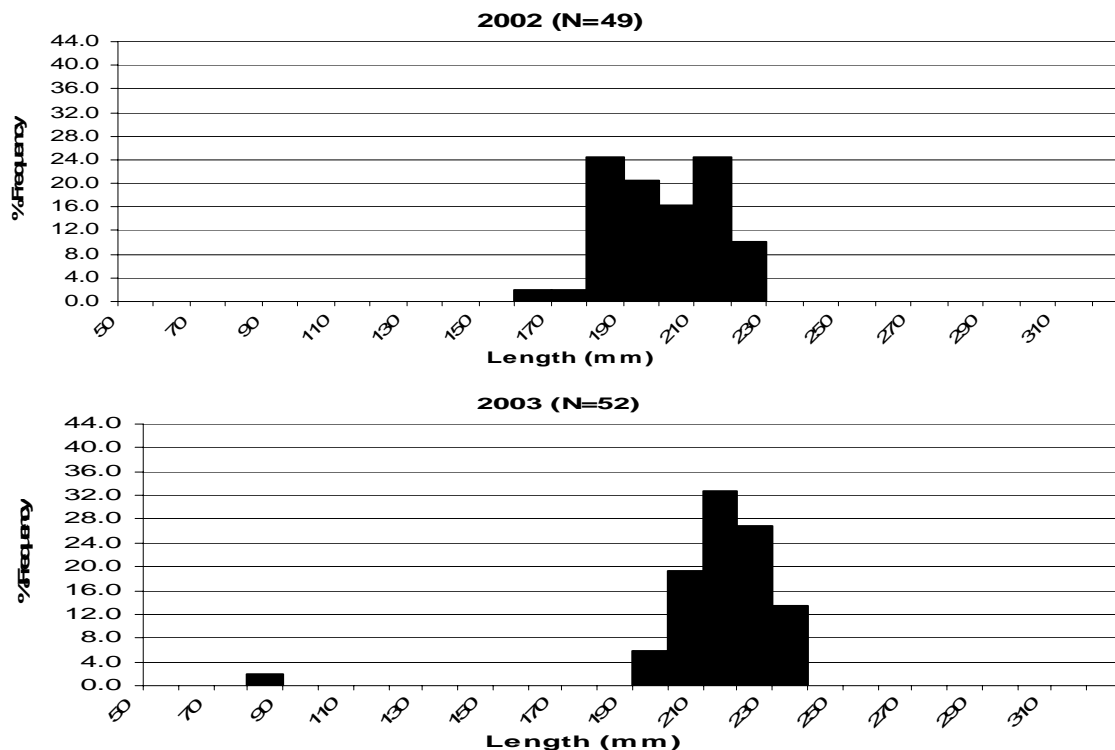


Figure 2. Length frequency histogram for black crappie collected in trap nets at Stockade Lake, Custer County, South Dakota for 2002-2003.

Largemouth bass

Size structure of the largemouth bass population has not changed much in the last few years. The proportion of quality-length (PSD; 12 inches) largemouth bass sampled during night electrofishing has remained fairly steady (Figure 2) and the portion of preferred-length bass (RSD-P; 15 inches) has also remained fairly equal, although at a lower value than desired. Mean condition has decreased slightly but still remains at excellent levels (mean W_r 's greater than 100).

Overall, catch per hour of stock-length (CPUE-S) bass has been variable, but is higher this year than last year. Because of the low catch rates in 2002, 409 nine adult largemouth bass were transferred into Stockade from Legion Lake. Lengths of bass caught during night electrofishing were encouraging and the most common size was those bass between 12-15 inches, which is good for panfish control issues. Largemouth bass were not originally stocked into Stockade Lake by the GFP and no official record of introductions exists.

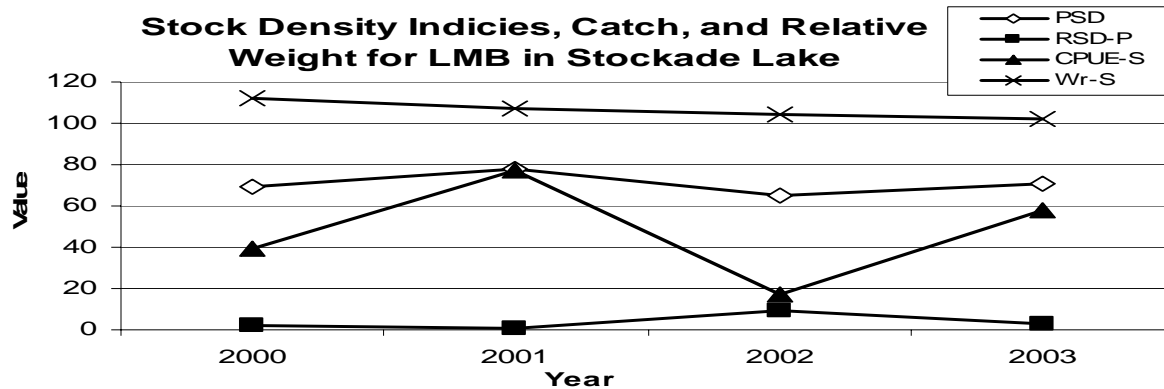


Figure 3. Stock density indices, catch per unit effort, and relative weights for largemouth bass captured during night electrofishing on Stockade Lake, Custer County, South Dakota from 2000-2003.

Smallmouth bass

PSD, RSD-P, and CPUE-S for smallmouth bass have remained low (Figure 4). Mean relative weight values have also declined since 2000. Unfortunately, during sampling only one smallmouth bass over quality-length was captured. Stockade Lake receives some of the highest angling pressure in the area and, hopefully, size structure will increase due to expansion of the 15-inch minimum-length-limit during 2004 to include smallmouth bass. Encouragingly, though, smallmouth bass have not been stocked into Stockade Lake since 1993 (Table 1) and have been maintaining a reproducing population

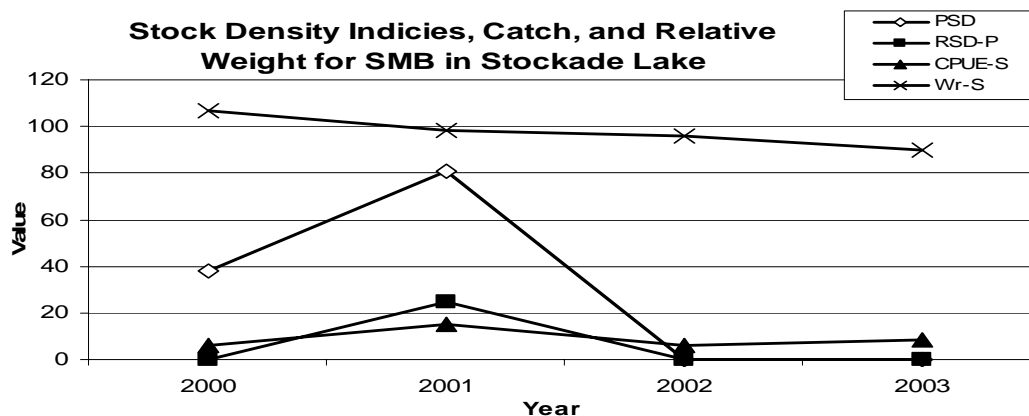


Figure 4. Stock density indices, catch per unit effort, and relative weights for smallmouth bass captured during night electrofishing on Stockade Lake, Custer County, South Dakota from 2000-2003.

Yellow perch

The PSD for yellow perch in Stockade Lake has been increasing over the last couple of years while RSD-P has slightly decreased (Figure 5). Catch per unit effort of stock-length perch would be considered low to moderate and although mean condition (mean Wr-S) has decreased slightly it still remains good. Age and back-calculated length values indicate yellow perch growth is similar to regional mean (Table 5) and perch are reaching quality-length (200 mm; 8 in) at 4 to 5 years of age.

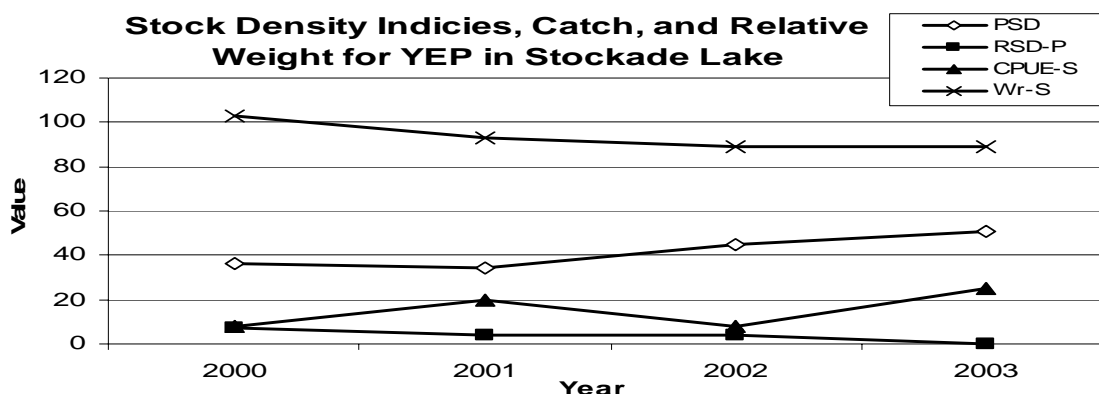


Figure 5. Stock density indices, catch per unit effort, and relative weights for yellow perch captured in gill nets at Stockade Lake, Custer County, South Dakota from 2000-2003.

Table 5. Mean back-calculated total length-at-age (mm) for yellow perch collected in gill nets from Stockade Lake for 2002-2003 compared with Region 1 (western SD) and statewide means developed by Willis (2001).

	YEAR	AGE							
		1	2	3	4	5	6	7	8
Stockade	2003	66	111	155	186	216			
Stockade	2002	69	116	162	193	213	227	241	264
Region 1	2001	70	117	158	186	208			
South Dakota	2001	86	145	190	220	242			

LITERATURE CITED

- Gigliotti, L.M. Fishing in South Dakota, 1999 Statewide Fishing Activity and Harvest Surveys, Resident and Nonresident Fishing. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.
- Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Curlew Lake

County: Meade

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 136 acres

Management Class: WWP

Maximum Depth: 22 feet

Mean Depth: 10.2 feet

Legal Description: Township 3N, Range 11E, Sections 2, 10, 11

MANAGEMENT GOAL

To optimize angling opportunities at Curlew Lake.

OBJECTIVES AND STRATEGIES

- Objective 1.** To maintain a walleye fishery with a minimum gill-net CPUE for stock-length walleye of 10, a PSD range of 30-60, RSD-P of 10 or greater, and a growth rate of 35.5 cm (14 in) at age-3.
- Strategy 1a. Evaluate the walleye population and 14-inch minimum length limit through standard lake netting surveys.
- Strategy 1b. Stock advanced walleye fingerlings into voids of natural production or when supplementing the population is needed.
- Objective 2.** To maintain a largemouth bass fishery with a minimum nighttime electrofishing CPUE for stock-length fish of 20, PSD range between 40 and 70, RSD-P between 10 and 40, and growth rates at or near the statewide average.
- Strategy 2a. Evaluate the largemouth bass population by conducting nighttime electrofishing.
- Strategy 2b. If survey information continually indicates Objective 2 is not being met and creel or anecdotal information indicates high harvest is the cause, then consider a 15-inch minimum length limit or protective slot to reduce harvest levels.
- Strategy 2c. When necessary, stock small (12 to 15 inch) adult bass to supplement into the existing population if CPUE falls below 20.
- Objective 3.** To decrease black crappie trap-net CPUE to less than 100 and maintain CPUE greater than 50, maintain PSD between 20 and 60, increase and maintain RSD-P greater than 5.
- Strategy 3a. Evaluate the black crappie population by conducting standard population surveys to determine density, size structure, growth and condition.
- Strategy 3b. Maintain predator densities (walleye, largemouth bass) at levels that, in addition to harvest, will effectively maintain crappie numbers within objective ranges.
- Objective 4.** Improve/maintain a high angler satisfaction.

Strategy 4a. Use anecdotal information from the local conservation officer, refuge personnel and other professional staff to determine angler attitudes.

Objective 5. Keep the local conservation officer, other agencies and the public informed of fisheries management activities and solicit their input when planning changes in management objectives.

Strategy 5a. Provide completed lake survey reports and management plans to other agencies and the public when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 2 to 4 years utilizing eight 24-hour frame net sets, a minimum of two 150' experimental gill net sets and six 10 minute night time electrofishing stations.
 2. If netting reveals walleye CPUE less than the stated objective values, stock advanced fingerlings at a rate of 1 to 2 lbs per surface acre (5 to 10 advanced fingerlings per surface acre) to supplement the population.
 3. If electrofishing reveals largemouth bass CPUE less than stated objective values then re-evaluate angler harvest and consider a protected length limit. If needed, also stock adult largemouth bass at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the population until an appropriate harvest is accomplished through regulations
 4. If anecdotal information indicates low angler satisfaction then re-evaluate angler attitudes towards the fishery and develop a management option that addresses angler wants.
 5. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.
-

INVENTORY

Curlew Lake, originally known as Viewfield Dam, is a 136-acre impoundment located in Meade County, 8 miles north, 4 miles east and 1½ miles north of New Underwood. The artificial lake was constructed by the South Dakota Department of Game, Fish and Parks in 1957 and is located within the Elk Creek watershed, ultimately draining into the Cheyenne River.

The watershed is comprised of 80% range and pasture lands and 20% cropland. Rooted aquatic vegetation appears along most of the shoreline. Bulrush is the primary emergent plant species associated with the lake. Coontail and grassy pondweed are abundant submersed vegetative species in the lake. Shoreline degradation due to cattle grazing occurs along the quarter sections not owned by the Game, Fish and Parks. The only developments at the lake are a boat ramp and outhouse which are both located on Game, Fish and Parks land for use by the angling public.

Ownership of Lake and Adjacent Lakeshore Properties:

Curlew Lake is owned and managed by the Department of Game, Fish and Parks. The GF&P owns 440 acres of land around Curlew Lake, which includes most of the 136 acres of the lake and immediate shoreline, excluding three quarter sections in Section 2 and a small tract of land comprising 10 acres in Section 11. The 10-acre tract in Section 11 has a written access agreement with the landowner; the three quarter sections in Section 2 do not have active access agreements. There is no record of problems regarding public access across this section of land.

Fishery Management:

Past management of Curlew Lake has been as a family fishery, providing small panfish and bullheads in the 1960's and 70's and more recently low numbers of walleye, largemouth bass and a high density, low quality black crappie and bluegill fishery. Although bass and walleye have been present during most of the reservoir's existence, it was felt the fishery was limited in "big fish" due to the lake's close proximity to Ellsworth Air Force Base and Rapid City.

Since construction of the dam fish stockings (Table 1) have been the primary fisheries management tool. Beginning in January 2004, a 14-inch minimum-length-limit for walleye was imposed at the reservoir to increase the density of the walleye population. It is also believed the increased walleye population can add to the black crappie and bluegill harvest, thereby, reducing density and increasing size structure of both panfish species to sizes more favorable to anglers.

Table 1. Stocking record for Curlew Lake, Meade County, 1990-2003.

Year	Species	Number	Size
1990	Largemouth bass	15,480	Fingerling
1991	Largemouth bass	14,000	Fingerling
1992	Largemouth bass	13,600	Fingerling
	Walleye	14,000	Fingerling
1993	Walleye	14,000	Fingerling
1995	Largemouth bass	7,450	Fingerling
	Walleye	1,360	Fingerling
1996	Largemouth bass	500	Fingerling
1997	Largemouth bass	4,000	Fingerling
2001	Largemouth bass	10,920	Fingerling
2002	Largemouth bass	13,600	Fingerling
2003	Walleye	2,174	Adv fingerling

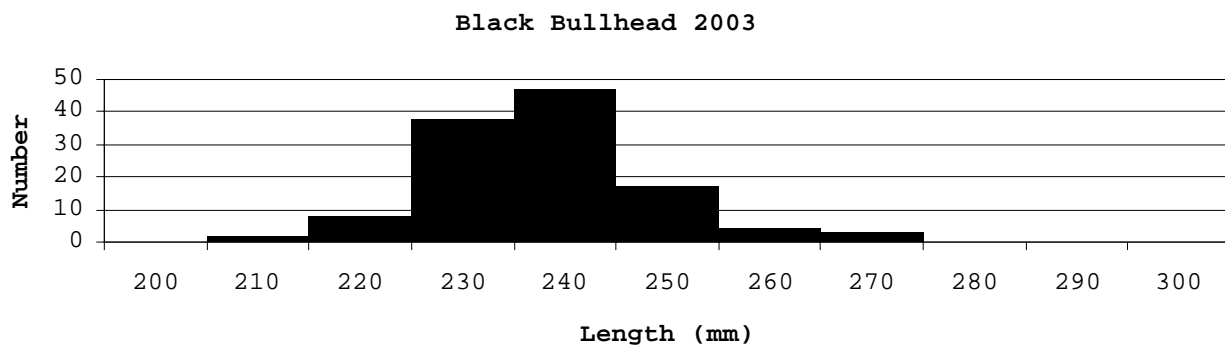
Characteristics of Fish Populations

Black bullhead

CPUE of bullheads in trap nets increased from 5 in 2000 to 23.5 in 2003 (Table 2). All fish captured ranged from 210 to 270 mm (Figure 1). PSD increased from 24 in 2000 to 91 in 2003. There were no bullheads over preferred-length in either of the last two surveys. Condition of black bullheads in Curlew Lake is fair. Mean relative weights (Wr) for stock-length and larger bullheads was 82.4 (Table 1). These fish may be having a hard time reaching larger sizes, because of competition with the many other species in Curlew.

Table 2. Trap net catch data for black bullheads, Curlew Lake, 2000 - 2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
2000	100		50 (64)	22 (7)	0 (0)	
2003	141	24 (11)	24 (11)	91 (4)	0 (0)	82.4 (1.7)

**Figure 1.** Length frequency of black bullhead from frame nets at Curlew Lake 6/10/2003.

Black Crappie

Curlew's fish population is dominated by black crappie. CPUE was 101.2 (Table 3) and all fish sampled were over stock-length (Figure 2). PSD was 79 and RSD-P was 1. Fish condition was average. Mean Wr for stock-length and larger fish was 93.3. The 2003 CPUE and Wr values were similar to the 2000 survey while PSD increased substantially. Growth was similar to 2000 and slower than the state average (Table 3).

Table 3. Trap net catch data for black crappies, Curlew Lake, 2000 - 2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
2000	961		120 (60)	26 (3)	0 (1)	
2003	607	101 (95)	101 (95)	79(3)	1(1)	93.3(0.7)

Table 4. Curlew lake black crappie year class, age in 2003, sample size (N), mean back-calculated length-at-age, population SE, the 2000 mean length-at-age, and South Dakota black crappie mean length-at-age (Willis et al. 2001).

Year	Age							
Class	Age	N	1	2	3	4	5	6
2001	2	7	79	125				
2000	3	15	70	139	183			
1999	4	11	75	134	175	202		
1998	5	10	71	140	175	198	215	
1997	6	1	69	132	197	210	225	242
Sample Size		44						
Mean (SE)			73 (2)	134 (3)	183 (5)	203 (4)	220 (5)	242 (0)
2000 Mean			75 (3)	127 (3)	173 (5)	199 (1)	217 (0)	226 (0)
SD Mean			83 (2)	147 (4)	195 (5)	229 (6)	249 (6)	

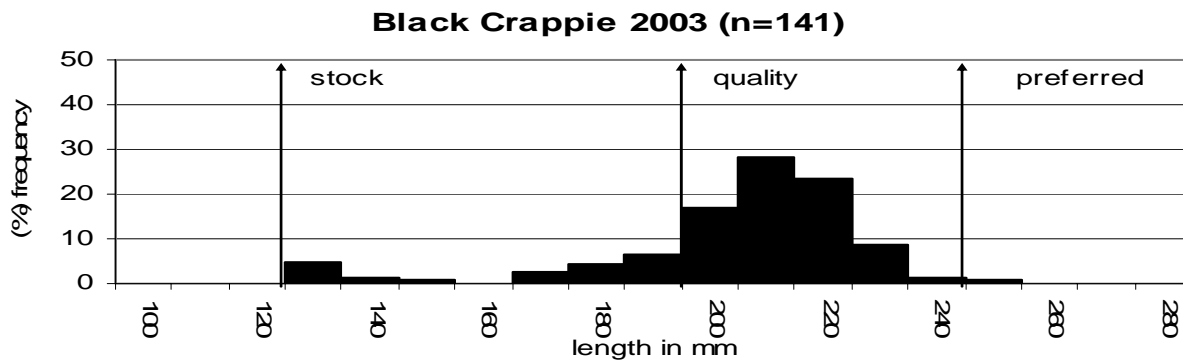


Figure 2. Length frequency of black crappie from frame nets, Curlew Lake, 2003.

Bluegill

Although angler catch of small bluegills was reported to be high, trap net catch of adult bluegill from Curlew Lake remained low. CPUE during the 2000 survey was 1.0, while CPUE in 2003 was 3.0 (Table 5). Stock density values (PSD = 61; RSD-P = 0) indicate the population is slightly out of balance and support anecdotal information from anglers. Possibly the high trap net catch rates of black crappie negatively influenced CPUE of adult bluegill. Fish condition was good with a mean W_r for stock-length and greater fish of 102.9.

Table 5. Trap net catch data for bluegill, Curlew Lake, 2000 - 2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	$W_r \bullet S$
2000	8		1 (1)	25 (25)	0 (0)	
2003	18	3.0 (3.0)	3.0 (3.0)	61 (21)	0	102.9 (1.2)

Largemouth bass

Largemouth bass were only species collected during nighttime electrofishing. Bass density was excellent with a CPUE for stock-length and larger bass of 46.0, the highest recorded in recent history (Table 6). Stock indices indicate a balanced population with a PSD of 41 and an RSD-P of 15 (Willis et al. 1993). Fish condition remains excellent with mean W_r for stock-length and larger bass of 113.2. Fish growth was excellent and greater than the 2001 mean and state average (Table 7). Length frequency histograms show excellent bass recruitment in recent years (Figure 3). Curlew appears to have and excellent bass population with good growth and recruitment.

Table 6. Catch data for largemouth bass collected by night electrofishing in Curlew Lake, 2000-2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	$W_r \bullet S$
2000	54	27.0	25.0	58 (12)	24 (10)	114.4 (3.8)
2001	64	29.9 (6.4)	15.8 (5.1)	77 (12)	3 (5)	114.7 (2.0)
2003	156	156.0 (28.7)	46.0 (16.6)	41 (13)	15 (9)	113.2 (1.0)

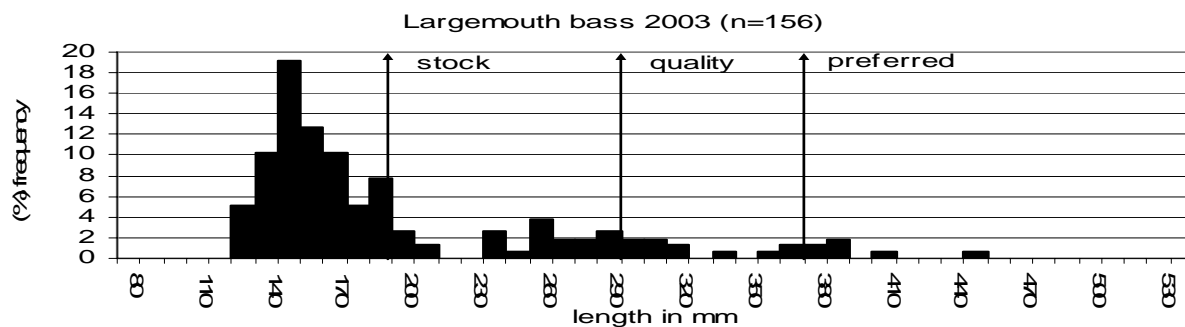


Figure 3. Length frequency for largemouth from night electrofishing in Curlew Lake, 2003.

Table 7. Curlew Lake largemouth bass age and growth data and the South Dakota largemouth bass mean length-at-age values (Willis et al. 2001).

Year	Age					
Class	N	Age	1	2	3	4
2002	40	1	69			

2001	24	2	89	212				
2000	5	3	112	232	304			
1999	3	4	85	181	277	335		
1998	3	5	73	198	270	326	368	
1997	1	6	76	181	255	293	328	362
Total	76							
Mean (SE)			84 (6)	201 (10)	277 (10)	318 (13)	348 (20)	362 (0)
2001			80 (4)	170 (8)	236 (17)	279 (20)	311 (33)	340 (44)
S.D. Mean			96 (3)	182 (6)	250 (7)	305 (8)	342 (8)	

Walleye

In hopes of establishing a more quality panfish fishery at Curlew, walleye density needs to improve. Gill net CPUE was 7.0 and CPUE greater than stock length was 6.0 (Table 8). In the fall of 2003, 2,174 walleye fingerlings were stocked. These fish averaged ten inches in length. With the addition of a 14-inch minimum, walleye should become an excellent second predator. Some natural reproduction has occurred as no walleye were stocked between 1993 and 2001, yet fish in these year classes are evident in the length frequency histogram (Figure 4).

Table 8. Gill net catch data for walleye from Curlew Lake, 2000 - 2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
2000	10		5 (2, 8)	80 (20)	30 (28)	
2003	14	7.0 (21.5)	6.0 (18.5)	33 (26)	0	83.6 (4.8)

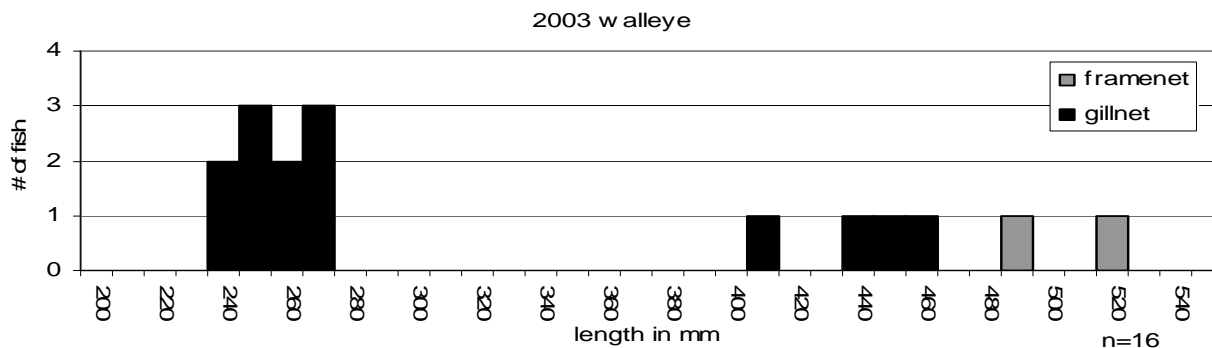


Figure 4. Length frequency for walleye from Curlew Lake, 2003.

Yellow Perch

Yellow perch density has increased since 2000 when only two perch were sampled in the gillnet. This survey had a CPUE of 26.5 of which 25.5 were of greater than stock length (Table 2). Size structure was small with a PSD of 2 and an RSD-P of 0. Fish condition was also low with a Wr for stock length and greater fish of 83.8. As expected, growth was slow. By age 4 perch were one year behind the state average (Table 8). The perch population seems to be outcompeted by the bluegill and black crappie populations.

Table 10. Curlew Lake yellow perch age in 2003, sample size (N), mean back-calculated total length at age, population standard error (SE).

Year Class	Age	N	1	2	Age 3	4
2002	1	2	91			
2001	2	15	94	140		
2000	3	5	85	134	169	
1999	4	1	80	122	152	193
Total		23				
2003 Mean (SE)			87 (3)	132 (5)	161 (8)	193 (0)
SD Mean (SE)			86 (2)	145 (4)	190 (5)	220 (5)

Other fish species

Northern pike are the other predator in Curlew and remain low in numbers with a gillnet CPUE of 4.0 (Table 2) and frame net CPUE of 0.2 (Table 1). In 2000, their numbers were 3.0 and 0.1, respectively. Other species caught include; one large channel catfish and two white suckers in the gill nets, and two common carp in the frame nets.

Literature Cited

- Willis, D.W., B.R. Murphy, and C.S. Guy. 1993. Stock density indices: development, use, and limitations. Reviews in Fisheries Science 1(3):203-222.
- Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.
-

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Durkee Lake

County: Meade

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 70 acres

Management Class: WWP

Maximum Depth: 20 feet

Mean Depth: 15 feet

Legal Description: Township 12N, Range 17E, Section 21, 28

MANAGEMENT GOAL

To optimize angling opportunities in Durkee Lake.

OBJECTIVES AND STRATEGIES

Objective 1. To maintain a largemouth bass fishery with a minimum night-time electrofishing CPUE for stock-length fish of 20, a PSD range between 40 and 70, RSD-P between 10 and 40, and growth rates at or near the statewide average.

Strategy 1a. Evaluate the largemouth bass population by conducting night-time electrofishing, every 2 to 4 years.

Strategy 1b. If survey information indicates Objective 1 is not being met and creel or anecdotal information indicates high harvest, then consider a protected length limit or decrease in creel limits to reduce harvest levels.

Strategy 1c. Stock small (12 to 15 inch) adult bass to supplement into the existing population to assist other strategies in maintaining Objective 1.

Objective 2. To reach and maintain panfish (bluegill, black crappie, black bullhead, and yellow perch) trap-net CPUE greater than 10 and less than 75 for each species. Maintain PSD's between 20 and 60 and RSD-P's between 5 and 20 for at least two of the panfish species.

Strategy 2a. Evaluate the panfish populations by conducting standard population surveys to determine density, growth and condition.

Strategy 2b. Maintain predator densities (largemouth bass and northern pike) at levels that, in addition to harvest, will effectively maintain panfish numbers within objective ranges.

Objective 3. Keep the Perkins County Conservation Officer, the Bureau of Reclamation, and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Strategy 3a. Provide lake survey reports, creel reports, and management plans when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 2 to 4 years utilizing eight 24-hour frame-net sets, a minimum of two 150' experimental gill net sets and six 10 minute night-time electrofishing stations.
2. Analyze fishery survey data and publish the data in report form in the Statewide Fisheries Surveys Annual Reports.
3. If electrofishing reveals largemouth bass CPUE less than stated objective values then re-evaluate angler harvest and consider a protected length limit. If needed, also stock adult largemouth bass at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the population until an appropriate harvest level is accomplished through regulations.
4. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.

INVENTORY

Durkee Lake is a 70-acre impoundment located on Spook Creek in Meade County, 3 miles south of Faith, SD. The artificial lake was constructed by a joint effort between the Works Progress Administration and the city of Faith in 1932 as a water supply for the city. The Department of Game, Fish and Parks assisted with repairs on the dam and spillway and assumed responsibility for managing the fishery.

The lake is located within the Cherry Creek watershed which eventually feeds into the Cheyenne River. The watershed above the lake is approximately 10 square miles of pastureland of which 8 square miles is private and used for grazing or farming. Over grazing and farming practices contribute to moderate to high siltation in the lake. The remaining 2 square miles are refuge land where no grazing is allowed. Rooted aquatic vegetation, consisting mostly of cattail and bullrush, appears along most of the shoreline. Summer months are often characterized as having large amounts of vegetation in the shallow bays and inlets.

Developments at the lake include a boat ramp and picnic area with a gravel parking lot and outhouses, a water treatment plant and a golf course clubhouse. The boat ramp is in fair condition. The dock was repaired prior to the 1999 survey and is now in good condition. The dam grade was repaired in 1997.

Ownership of Lake and Adjacent Lakeshore Properties:

The City of Faith owns Durkee Lake. The SD Department of Game, Fish and Parks manages the fishery in the lake. The lake is located within the boundary of the Durkee Lake State Game Bird Refuge. The refuge contains 1,280 acres and is located in Sections 21, 28 and the portion of Section 27 west of SD Highway 73. Hunting is illegal in or around Durkee Lake by city ordinance and a city-administered golf course is located adjacent to the lake.

Fishery Management:

Stocking records indicate fish stockings in Durkee Lake since 1936. Stocking has been the primary fisheries management tool (Table 1). Since the first stockings there have been 10 different species of fish stocked into the lake. Past management of Durkee has been as a panfish, northern pike, largemouth bass and walleye fishery. The past management goal has been to provide 2 pounds of fish per angler per day.

Table 1. Stocking record for Durkee Lake, Meade County, 1988-2003.

Year	Species	Number	Size
1988	Largemouth bass	8500	Fingerling
	Northern pike	4000	Fingerling
1989	Largemouth bass	10,000	Fingerling
1993	Largemouth bass	7700	Fingerling
1994	Fathead minnow	3000	Adult
	Golden shiner	1800	Adult
	Largemouth bass	12,000	Fingerling
	Yellow perch	92	Adult
1995	Bluegill	400	Fingerling
1996	Black crappie	420	Adult
	Largemouth bass	5000	Fingerling
1997	Black crappie	400	Adult
	Largemouth bass	8500	Fingerling
1998	Largemouth bass	8500	Fingerling
2000	Black crappie	500	Adult
	Largemouth bass	8500	Fingerling
2002	Largemouth bass	589	Adult
	Smallmouth bass	100	Adult

Characteristics of Fish Populations:

Fish population surveys were conducted at Durkee Lake on July 8-10 and September 9, 2002. July sampling consisted of 2 gill net nights and 8 trap net nights, while the September sampling was 6 ten-minute night electrofishing stations. Seven species of fish were collected throughout the survey. Results from the survey and past surveys are included in the following tables, figures, and text.

Table 2. Catch data for all fish species collected from eight, ¼ inch trap nets in Durkee Lake, Meade County, July 8-10, 2002.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	229	28.6(9.9)	28.6(9.9)	36(5)	0(na)	-----
Black crappie	225	28.1(17.2)	28.1(17.2)	0(na)	0(na)	93.1(1.3)
Bluegill	811	101.4(42.6)	101.4(42.6)	14(2)	1(1)	102.7(2.3)
Largemouth bass	1	0.1(0.2)	0.1(0.2)	na	na	112.6(na)
Northern pike	1	0.1(0.2)	0.1(0.2)	na	na	85.4(na)
Yellow perch	58	7.3(2.4)	7.3(2.4)	10(6)	0(na)	89.0(2.0)
Total	1325					

Table 3. Catch data for all fish species collected from two 150-ft experimental sinking gill nets in Durkee Lake, July 8-10, 2002.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	76	38.0(70.8)	38.0(70.8)	49(10)	0(na)	89.8(1.1)
Black crappie	38	19.0(46.1)	19.0(46.1)	0(na)	0(na)	91.4(1.6)

Bluegill	30	15.0(24.6)	15.0(24.6)	20(13)	0(na)	108.0(1.6)
Channel catfish	10	5.0(3.1)	5.0(1.5)	50(31)	10(18)	110.5(na)
Largemouth bass	1	0.5(1.5)	0.5(1.5)	na	na	111.0(na)
Northern pike	7	3.5(1.5)	3.5(1.5)	100(na)	14(28)	93.7(3.0)
Yellow perch	67	33.5(75.4)	26.0(52.3)	0(na)	0(na)	92.6(0.4)
Total	229					

Black bullhead

Black bullheads were sampled in abundance during the survey. Trap net CPUE has remained high (Table 3). PSD values also remained good but RSD-P was 0 for both gill nets and trap nets in 2002. The continued high density and lack of larger bullheads indicates an unbalanced population. Condition of the bullheads also indicates similar characteristics as mean Wr for stock-length and larger bullheads was 89.8.

Table 4. Composite listing of trap-net catch for black bullheads collected from Durkee Lake, 1989-2002.

Year	N	CPUE	CPUE-S	PSD
1989	1,366	113.8		98
1995	540	67.5		35
2003	225	28.6(9.9)	28.6(9.9)	36(5)

Black Crappie

Black crappie were the third most abundant species (Table 2). Trap net CPUE was 28.1. Size structure was small and no fish sampled were over quality-length (Table 5). Similar to the other panfish in Durkee, black crappie are experiencing slow growth. The average five year old crappie measured 179 mm which is 4 inches shorter than the statewide average for a 5 year old crappie (Table 6). Fish condition was average with a mean Wr for stock-length and larger crappie of 93.1 (Table 2). It appears the crappie population is over abundant and increased predation may improve growth and size structure.

Table 5. Composite listing of trap-net catch for black crappie collected from Durkee Lake, 1989-2002.

Year	N	CPUE	CPUE-S	PSD
1989	1,431	119.3		4
1995	2	0.3		
2003	225	28.1(17.2)	28.1(17.2)	0(na)

Table 6. Durkee black crappie year class, age in 2002, sample size (N), mean back-calculated total length-at-age, the Region 1 mean length-at-age, and the South Dakota state-wide black crappie mean length-at-age (Willis et al 2001). Standard errors are in parentheses.

Year Class	Age	N	1	2	3	4	5
1999	3	5	60	105	135		
1998	4	11	65	118	143	158	
1997	5	10	75	130	156	170	179
Sample Size		26					
2002 Mean			66(4)	118(7)	144(6)	164(6)	179(0)
Region 1			74 (3)	122 (7)	158 (9)	197 (13)	217 (16)

Bluegill

Catch has varied substantially during the past surveys but bluegill were the most abundant fish sampled in Durkee Lake in 2003 (Table 2). Stock density indices were much lower than desired for a good panfish fishery and, as expected, growth was also slow. Fish condition was good, however, with a mean W_r of 102.7 for stock-length and larger fish. It is evident that the bluegill population is exhibiting characteristics of an overabundant population and, similar to the black crappie population. Increased predation may improve growth and size structure.

Table 7. Composite listing of trap-net catch for bluegill collected from Durkee Lake, 1989-2002.

Year	N	CPUE	CPUE-S	PSD
1989	850	70.8		93
1995	3	0.4		
2003	811	101.4 (42.6)	101.4 (42.6)	14 (2)

Largemouth bass

Largemouth bass densities in Durkee are low. Night electrofishing yielded a stock-length and larger CPUE of 16.0 bass per hour and surveys from the past five years all were below 30 stock-length bass per hour (Table 8). Size structure was a little low with a PSD of 38 and a RSD-P of 6. Stock indices were similar to the 2000 electrofishing survey when PSD was 37 and RSD-P was 17. Mean condition was excellent with all length categories having W_r 's over 107. Growth was slower than the statewide mean, but average for a small west river dam (Table 9). During the fall 589 small adult largemouth bass were stocked from a stunted bass population to help increase bass density. Average size of bass stocked was around 8 inches.

Table 8. Catch data for largemouth bass collected by electrofishing in Durkee Lake, 1997-2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	$W_r \bullet S$
1997	23	23.0	9.0	89	0	125.2 (5.9)
1998	18	9.0	8.5	82	47	111.4 (5.3)
1999	50	25.0	13.0	78 (10)	63 (12)	118.1 (1.6)
2000	58	31.5	28.3	37 (12)	17 (9)	105.7 (0.8)
2002	37	37.0 (10.8)	16 (7.5)	38 (22)	6 (11)	108.3 (2.7)

Table 9. Age and growth data for Durkee Lake largemouth bass and the South Dakota largemouth bass mean length-at-age (Willis et al. 2001).

Table 1: Largemouth bass mean length at age (Willis et al. 2001).							
Year	Age						
Class	Age	N	1	2	3	4	5
2001	1	6	97				
2000	2	9	85	151			
1999	3	1	80	134	202		
1998	4	3	89	169	248	308	
1997	5	2	86	170	218	273	311
Sample Size		21					
Mean (SE)			87 (3)	156 (9)	223 (13)	291 (18)	311 (0)

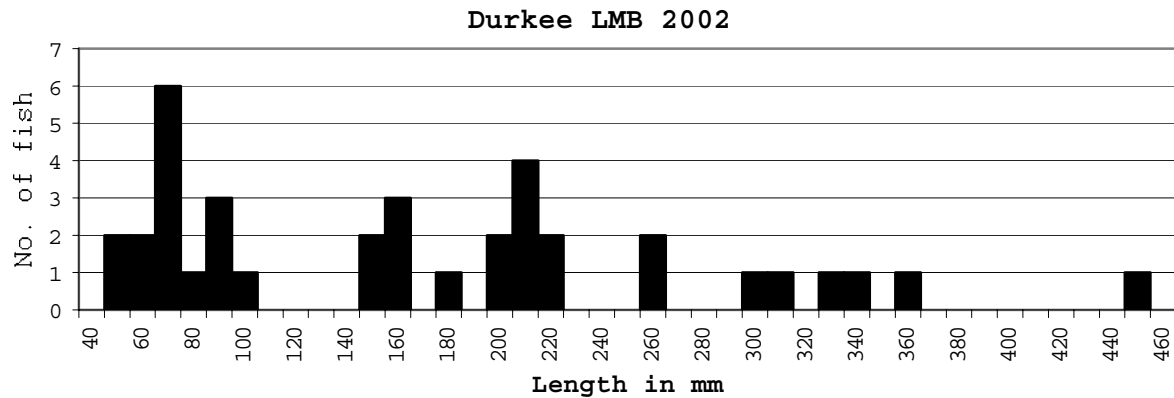


Figure 1. Length frequency for largemouth from night electrofishing in Durkee Lake, 2002.

LITERATURE CITED

Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and water type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Newell Lake

County: Butte

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 183 acres

Management Class: WWP

Maximum Depth: 32 feet

Mean Depth: 13.6 feet

Legal Description: Township 10N, Range 6E, Section 9

MANAGEMENT GOAL

To optimize angling opportunities in Newell Lake.

OBJECTIVES AND STRATEGIES

Objective 1. To maintain a walleye fishery with a minimum gill-net CPUE for stock-length walleye of 10, a PSD range of 30-60, an RSD-P of 10 or greater, and a growth rate of 35.5 cm (14 in) at age-3.

Strategy 1a. Evaluate the walleye population by conducting lake surveys.

Strategy 1b. Stock advanced walleye fingerlings into voids of natural reproduction or when supplementing the population is needed.

Objective 2. To maintain a largemouth bass fishery with a minimum nighttime electrofishing CPUE for stock-length fish of 20, a PSD range between 40 and 70, RSD-P between 10 and 40, and growth rates at or near the statewide average.

Strategy 2a. Evaluate the largemouth bass population and new regulation by conducting nighttime electrofishing, coinciding with lake surveys.

Strategy 2b. If necessary, stock adult bass to supplement the existing population.

Objective 3. To maintain bluegill trap-net CPUE at less than 100 and CPUE of stock-length fish greater than 20, maintain PSD between 50 and 80, RSD-P between 10 and 30 and growth at or near the statewide average.

Strategy 3a. Evaluate the bluegill population by conducting standard population surveys to determine density, growth and condition.

Strategy 3b. Maintain predator densities (i.e. walleye, largemouth bass, northern pike) at levels that, in addition to harvest, will effectively maintain bluegill numbers within objective ranges.

Objective 4. Keep the local Conservation Officer and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Strategy 4a. Provide lake survey reports, creel reports, and management plans when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 2 to 4 years utilizing eight 24-hour frame net sets, a minimum of two 150-foot experimental gill net sets and six 10-minute night time electrofishing stations.
2. If netting reveals walleye CPUE less than the stated objective values then stock advanced fingerlings at a rate of 1 to 2 lbs per surface acre (5 to 10 advanced fingerlings per surface acre) to supplement the population.
3. If electrofishing reveals largemouth bass CPUE less than stated objective values then stock adult largemouth bass at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the population.
4. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.

INVENTORY

Newell Lake is a 183-acre impoundment located on South Willow Creek in Butte County; 8 miles north and 2 miles east Newell, SD. The artificial lake was constructed by the South Dakota Department of Game, Fish and Parks on department owned land in 1958.

The watershed is 12 square miles of pasture land that is in primarily private ownership and used for livestock grazing. There is approximately 1¼ square miles of state owned land surrounding the reservoir that remains ungrazed. During summer months there are large amounts of shoreline vegetation in the shallow bays and inlets.

Developments at the lake include a boat ramp, gravel parking lot and outhouse on the south east shore and a day use park with outhouses on the north east shore. In 1998, following the lake survey, major damage occurred to the tubes that required rebuilding the spillway. Work on the spillway was completed in 1999. The spillway and dam are currently in good condition.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

Newell Lake is owned and managed by the Department of Game, Fish and Parks. The GF&P owns approximately 1¼ square miles of the land surrounding the lake. The shoreline is primarily managed as a recreation area and a game production area with some cattle access on the north west shoreline. Although the GF&P owns the shoreline access is provided through an access agreement over private property.

Fishery Management:

Past management of Newell Lake has been, and continues to be, as a family fishery for walleye and largemouth bass. Northern pike and channel catfish were stocked early in the life of the reservoir in an attempt to establish these species. Northern pike densities are moderate and they continue to be collected during annual sampling and caught by anglers. Saugeye were stocked in 1990 as part of a state wide project to assess saugeye survival and growth in comparison with walleye. Saugeye stockings were discontinued in 2000 and replaced by stockings of large walleye fingerlings during 2003.

Since construction of the lake, stockings (Table 1) have been the primary fisheries management tool in the reservoir. Beginning in January 2004, a 14-inch minimum-length-limit for walleye was imposed at the reservoir to aid in increasing the numbers and size structure of the walleye population. It is also believed the increased walleye population can aid in maintaining moderate density and good size structure of panfish populations and keep the European rudd population at a lower density.

Fish Population Characteristics:

A netting survey of Newell Lake's fish population was conducted from July 1st to the 3rd, 2002 and night electrofishing was last completed on October 17, 2003. The netting survey consisted of 2 gill net nights and 8 trap net nights while the fall night electrofishing consisted of 6 ten-minute stations. Eight species of fish were collected throughout the surveys and the results are included in the following tables and text.

Table 1. Stocking record for Newell Lake, Butte County, 1990-2003.

Year	Species	Number	Size
1990	Saugeye	18,000	Fingerling
	Walleye	17,000	Fingerling
1991	Northern pike	17,000	Fingerling
1991	Smallmouth bass	17,000	Fingerling
	Saugeye	17,000	Fingerling
1992	Largemouth bass	13,600	Fingerling
	Saugeye	16,000	Fingerling
1993	Smallmouth bass	17,000	Fingerling
	Saugeye	17,000	Fingerling
1994	Saugeye	27,000	Fingerling
1995	Saugeye	20,000	Fingerling
1996	Largemouth bass	17,000	Fingerling
1997	Saugeye	4,200	Large fingerling
	Largemouth bass	18,400	Fingerling
1998	Saugeye	1,800	Adv fingerling
2000	Saugeye	25,000	Fingerling
2001	Largemouth bass	100	Adult
2002	Largemouth bass	11,800	Fingerling
2003	Walleye	1,120	Adv fingerling

Table 3. Catch data for all fish species collected from eight ¼-inch trap nets in Newell Lake, Butte County, July 1-3, 2002.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	1	0.1(0.2)	0.1(0.2)	NA	NA	90.4
Bluegill	192	24.0(9.7)	24.0(9.7)	76(5)	16(5)	92.1(1.0)
Largemouth bass	1	0.1(0.2)	0.1(0.2)	NA	NA	76.0
Northern pike	11	1.4(0.7)	1.1(0.5)	0(NA)	0(NA)	71.4(4.0)
Rudd	144	18.0(9.2)	NA	NA	NA	
Walleye	9	1.1(0.6)	1.1(0.6)	67(31)	11(21)	74.9(3.4)
White sucker	19	2.4(1.1)	2.4(1.1)	100(NA)	100(NA)	82.1(2.3)
Yellow perch	17	2.1(1.5)	2.1(1.5)	71(20)	53(22)	77.4(3.0)
TOTAL	394					

Table 4. Catch data for all fish species collected from two 150-ft experimental sinking gill nets in Newell lake, Butte County, 2002.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	1	0.5 (1.5)	0.5 (1.5)	NA	NA	93.2
Northern pike	5	2.5 (1.5)	2.5 (1.5)	0 (NA)	0 (NA)	78.5 (3.3)
Rudd	8	4.0 (12.3)	NA	NA	NA	NA
Walleye	4	2.0 (3.1)	2.0 (3.1)	0 (NA)	0 (NA)	71.7 (2.5)
White sucker	9	4.5 (10.8)	4.5 (10.8)	100 (NA)	33 (31)	98.2 (2.2)
Yellow perch	10	5.0 (3.1)	5.0 (3.1)	20 (24)	10 (18)	84.3 (2.4)
Total	37					

Bluegill

Bluegill were the most abundant panfish collected at Newell Lake in 2002 and stock density values were PSD of 76 and RSD-P of 16 (Table 2). Mean condition was average with a mean Wr for stock-length and larger fish of 92.1 and growth was good with 5 year old bluegill being right at the state average (Table 5).

Table 5. Newell Lake bluegill age data and the South Dakota mean length-at-age (Willis et al. 2001).

Year Class	Age	N	1	2	3	4	5
1999	3	12	56	92	119		
1998	4	19	49	83	121	151	
1997	5	8	48	79	112	152	182
Sample Size		39					
South Dakota Mean			52	101	141	164	181

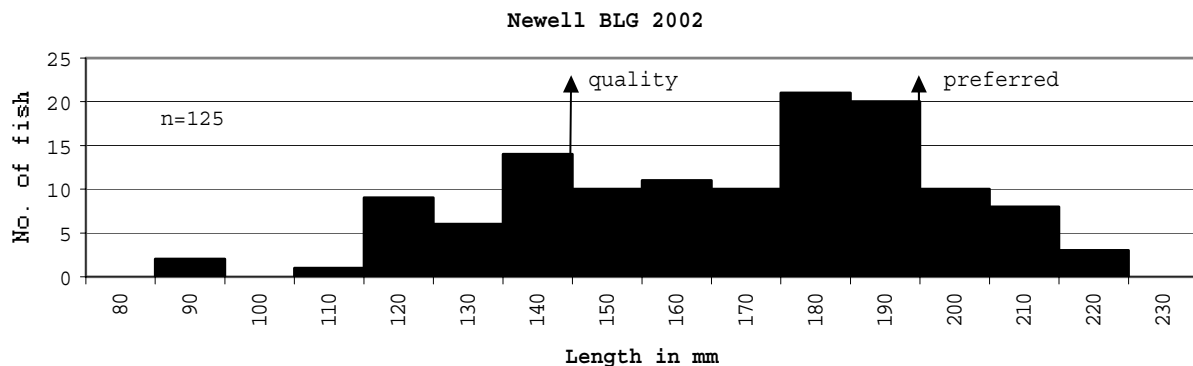


Figure 1. Length frequency histogram of bluegill collected by frame nets in Newell Dam, July 1-3, 2002.

Largemouth Bass

Newell Lake's bass population is improving in both quantity and quality. CPUE for stock-length and greater fish increased from 19.2 in 2002 to 41.0 in 2003 (Table 1). Growth was excellent with back-calculated lengths over the state average (Table 2), possibly due to abundant forage found in Newell. Condition was also excellent with mean W_r values for stock-length and larger fish of 106.7 and condition stayed above 100 throughout all length groups. A 12 to 16 inch slot with a one over 16 inch regulation is in place for 2004 to increase the numbers of larger bass.

Table 2. Composite listing of catch data for largemouth bass collected by electrofishing in Newell Lake, 1999-2003.

Year	N	Pedal Time (sec)	CPUE	CPUE-S	PSD	RSD-P	$W_r \cdot S$
1999	29	-----	14.5	9.0	67 (15)	27 (14)	--
2000	3	4,116	2.6	2.6	--	--	--
2002	125	7,200	82.2 (28)	19.2 (7)	50 (16)	0	114.6 (1.3)
2003	77	3,600	77.0 (23)	41.0 (14)	27 (12)	15 (10)	106.7 (1.3)

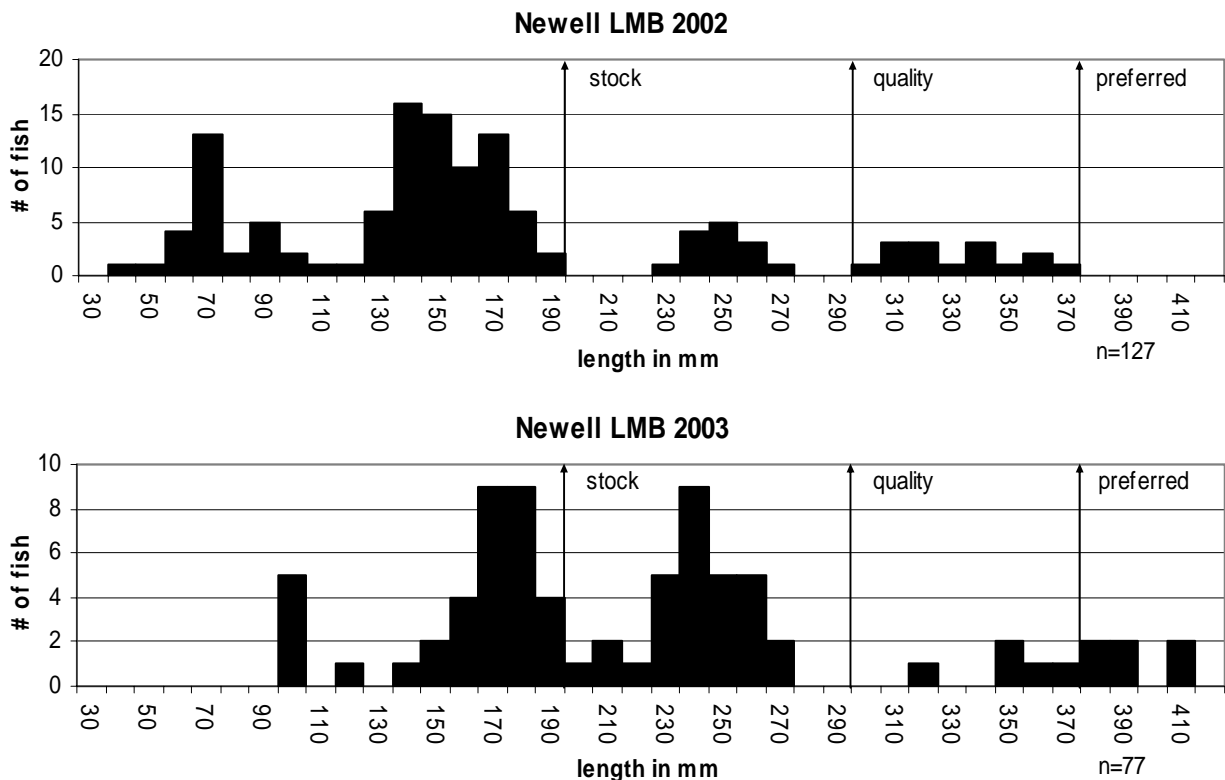


Figure 1. Length frequency histogram of largemouth bass collected by electrofishing in Newell Dam, 2002-2003.

Northern Pike

Netting results suggest Newell's pike population remains low. Gill net CPUE was 2.5, and a frame net CPUE was 1.4 (Tables 2 and 3). A large number of smaller northern pike •quality length (530 mm), however, were observed during night electrofishing in 2003. From the 16 fish sample in 2002 no northerns over the quality-length were collected. Although growth analysis was not accomplished it should be considered in the future as growth rates may be a limiting factor in size structure of the population. Overall, it appears that due to the large number of small pike observed during night electrofishing and observed high angling pressure, growth and harvest may both be keeping size structure low.

Walleye

Although walleye and/or saugeye have been stocked almost yearly into Newell Lake, density remains low (Tables 2 and 3). Also, during seining efforts in 2001 a single age-0 walleye/saugeye was collected and, although saugeye are a fertile hybrid between walleye and sauger, reproduction is limited. Difficulties in obtaining saugeye fingerlings have changed the stocking strategy to advanced walleye fingerlings. It is hoped the larger walleye fingerlings will recruit into the population and possibly increase natural reproduction. In addition, a 14-inch minimum was implemented January 1, 2004 to protect small walleye from possible harvest in a heavily fished lake.

LITERATURE CITED

Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom.
2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Wicksville Dam

County: Pennington

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-29

Date: Jan 1, 1996 to Dec 31, 2000

Surface Area: 6 acres

Management Class: WSP

Maximum Depth: 16 feet

Mean Depth: 9 feet

Legal Description: Township 2N, Range 13E, Section 32

MANAGEMENT GOAL

To optimize angling opportunities in Wicksville Lake.

OBJECTIVES AND STRATEGIES

- Objective 1.** To maintain a largemouth bass fishery with a minimum night-time electrofishing CPUE for stock length fish of 20, a PSD range between 40 and 70, RSD-P between 10 and 40, and growth rates at or near the statewide average.
- Strategy 1a. Evaluate the largemouth bass population and new regulation by conducting nighttime electrofishing.
- Strategy 1b. If necessary, stock adult bass to supplement the existing population.
- Objective 2.** Maintain bluegill trap-net CPUE to less than 100 and CPUE-S greater than 20, maintain PSD between 50 and 80 and RSD-P between 10 and 30 and growth at or near the statewide average.
- Strategy 2a. Evaluate the bluegill population by conducting standard population surveys to determine density, growth and condition.
- Strategy 2b. Maintain predator densities (i.e. largemouth bass) at levels that, in addition to harvest, will effectively maintain bluegill numbers within objective ranges.
- Objective 3.** Keep the local conservation officer and the public informed of fisheries management activities and solicit their input when planning changes in management objectives.
- Strategy 3a. Provide completed lake survey reports and management plans when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 5 years utilizing four 24-hour frame-net sets, a minimum of one 150' experimental gill net sets and as many 10 minute night time electrofishing stations that can be completed within a total effort of 60 minutes.
2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
3. If electrofishing reveals largemouth bass CPUE less than stated objective values then stock adult largemouth bass at a rate of 1 to 2 lbs per surface acre (2 to 5 adults per surface acre) to supplement the population.
4. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.

INVENTORY

Wicksville Lake is a 6-acre impoundment located one half mile east of Wicksville, SD. The artificial lake was constructed by the Works Progress Administration in the 1930's.

The watershed above Wicksville is approximately 2.6 square miles in size. Pasture and hayland make up most of the watershed (65%) while farming constitutes the remaining 35%. Rooted aquatic vegetation, consisting mostly of cattail surrounds the lake and limits access to the shoreline during late summer. Smartweed is the dominant submergent vegetative type.

No boat ramp exists at the lake. A small opening in the vegetation near the dam was used as a boat access site in the past. Currently there is an opening on the north central shoreline that functions as a boat ramp.

Ownership of Lake and Adjacent Lakeshore Properties:

Other than a small portion of private land at the upper end of the impoundment, Pennington County owns the land immediately around the reservoir. Until 1971 the land was managed as a county park after which the Pennington County Board of Commissioners entered a 50-year management contract with the Department of Game, Fish and Parks. The department currently has responsibility for planning, developing and maintain the park as a wildlife area.

Fishery Management:

Past management of Wicksville Lake has been as a largemouth bass, channel cat and bluegill fishery. The lake was nearly drained during 1960 and attempts to eradicate the remainder of the lake at this time were unsuccessful. During July 18, 1968 and July 10, 1969, shoreline applications of rotenone were accomplished in an unsuccessful attempt to reduce bluegill density. A complete renovation of the dam and its watershed took place in the fall of 1972. The lake was restocked with rainbow trout, catfish and largemouth bass. Since the renovation Wicksville has been managed primarily as a bluegill-largemouth bass fishery.

Table 1. Stocking record for Wicksville Lake, Pennington County, 1973-2003.

Year	Species	Number	Size
1973	Channel catfish	1,600	Fingerling
	Largemouth bass	2,500	Fingerling
	Fathead minnows	1,000	Juveniles
	Rainbow trout	4,000	Fingerling
1976	Largemouth bass	300	Fingerling
1977	Channel catfish	700	Fingerling
	Rainbow trout	3,600	Catchable
1978	Rainbow trout	1,000	Catchable
1979	Channel catfish	4,000	Fingerling
1982	Largemouth bass	1,000	Fingerling
1990	Largemouth bass	1,200	Fingerling
1991	Largemouth bass	1,000	Fingerling
1999	Largemouth bass	194	Juvenile
	Walleye	500,000	Fry
2002	Largemouth bass	600	Fingerling

Fish Population Characteristics:

A netting survey of the Wicksville Dam fish population was conducted from June 9-11, 2003. The survey consisted of 4 trap net nights. Only two species of fish, bluegill and black bullhead, were collected. Results from the survey are included in the following tables and text.

Table 1. Catch data for all species collected from four, ¾ inch frame nets in Wicksville Dam, Pennington County June 10, 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr>S
Black bullhead	18	4.5(2.0)	4.5(2.0)	100(--)	78(18)	102.6(3.8)
Bluegill	144	36.0(8.3)	36.0(8.3)	63(7)	1(1)	101.9(0.7)
Total	162					

Black bullhead

Black bullhead densities were low during the 2003 survey. CPUE was 4.5 (Table 1). Size structure, however, was high (Figure 1) with a PSD of 100 and a RSD-P of 78. Fish condition was also good with a mean W_r for stock-length and larger fish of 102.6. The bullhead population is low density with a high percentage of preferred-length fish which suggest that, though bass were not sampled due to low water, the bass are doing well and keeping bullhead densities low and size structure high.

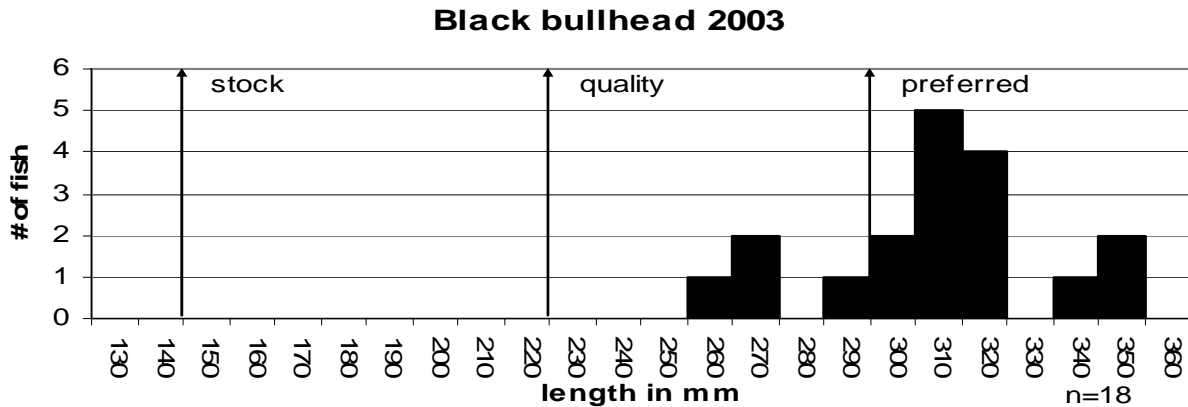


Figure 1. Length frequency histogram for black bullheads from frame nets at Wicksville Dam, June 10, 2003.

Bluegill

Bluegill were abundant in the frame net catch. All bluegill sampled were stock-length or longer and CPUE was 36.0 (Table 2). Stock indices yielded a PSD of 63 and a RSD-P of 1 and mean condition was good with a W_r of 101.9 (Table 1). Growth was slower than the statewide mean but right at the Region I mean (Table 2). The bluegill appear to be doing well although size structure is still a little low.

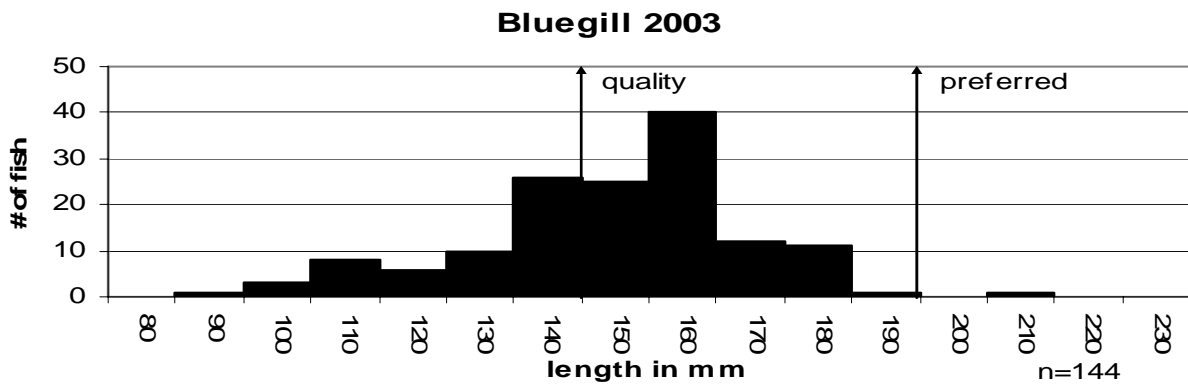


Figure 2. Length frequency histogram for black bluegill from frame nets at Wicksville Dam, June 10, 2003.

Table 2. Wicksville bluegill year class, age in 2003, sample size (N), mean back-calculated total length at age, population standard error (SE), and the South Dakota black crappie mean length-at-age and Region I mean length-at-age, (Willis et al. 2001).

Year	Age	N	Age
------	-----	---	-----

Class			1	2	3	4	5	6	7
2001	2	8	59	97					
2000	3	7	41	74	116				
1999	4	18	46	81	121	147			
1998	5	7	37	66	104	148	166		
1997	6	1	38	74	109	138	163	176	
1996	7	1	36	70	117	152	176	194	204
Sample size			42						
2003 Mean (SE)			43 (4)	77 (4)	113 (3)	146 (3)	168 (4)	185 (9)	204 (0)
Region 1			52 (5)	92 (6)	123 (5)	146 (5)	166 (6)		
South Dakota (SE)			55 (2)	103 (3)	141 (3)	166 (4)	180 (4)		

Literature Cited

Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom.
2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: East Lemmon Lake

County: Perkins

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-29

Date: Jan 1, 1996 to Dec 31, 2000

Surface Area: 180 acres

Management Class: WSP

Maximum Depth: 16 feet

Mean Depth: 8.5 feet

Legal Description: Township 21N, Range 17E, Section 21, 16

MANAGEMENT GOAL

To optimize angling opportunities in East Lemmon Lake.

OBJECTIVES AND STRATEGIES

- Objective 1.** To maintain a largemouth bass fishery with a minimum night time electrofishing CPUE for stock-length fish of 20, a PSD range between 40 and 70, RSD-P between 10 and 40, and growth rates at or near the statewide average.
- Strategy 1a. Evaluate the largemouth bass population and 15-inch minimum-length-limit by conducting annual night electrofishing.
- Strategy 1b. If necessary, stock adult bass to supplement the existing population.
- Objective 2.** To increase and maintain yellow perch gill-net CPUE to 25 or greater for stock-length and larger fish and maintain PSD between 20 and 40.
- Strategy 2a. Evaluate the yellow perch population by conducting standard population surveys to determine density, growth and condition.
- Strategy 2b. Maintain predator densities at levels that, in addition to harvest, will effectively maintain yellow perch numbers within objective ranges and reduce white sucker density.
- Objective 3.** Reduce white sucker density.
- Strategy 3a. Meet with anglers and groups by March 2005 and discuss northern pike or tiger muskie introductions.
- Strategy 3b. Stock age-1 and older northern pike or tiger muskie at a rate of 2 to 5 per surface acre. Maintain northern pike/tiger muskie densities at levels that will effectively maintain yellow perch numbers within objective ranges and reduce white sucker density.
- Objective 4.** Keep the local conservation officer, other agencies and the public informed of fisheries management activities and solicit their input when planning changes in management objectives.

Strategy 4a. Provide completed lake survey reports and management plans to other agencies and the public when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 2 to 4 years utilizing eight 24-hour frame-net sets, a minimum of two 150' experimental gill net sets and six 10 minute night time electrofishing stations.
 2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
 3. If electrofishing reveals largemouth bass CPUE less than stated objective values then stock adult largemouth bass at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the population.
 4. Meet with the Perkins County Conservation Officer, local sportsmen and other interested parties to discuss northern pike or tiger muskie introductions.
 5. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.
-

INVENTORY

East Lemmon Lake, also known as Lemmon State Lake, is a 169-acre impoundment located 11 miles east and 7 miles south of the city of Lemmon in Perkins County. The artificial lake was constructed in the 1936 by a joint effort involving the Works Progress Administration, the city of Lemmon and the Department of Game, Fish and Parks. Since construction, the dam and dam grade have had to be repaired on a few occasions. The first occurred in 1970 when severe erosion threatened to destroy the spillway. Then, in fall 1997, a temporary repair was preformed due to a cavity that developed in the spillway during the spring of 1995. In the fall of 2000 a full repair of the dam including intakes, tubes and spillway was completed. The cost of the 2000 project at completion was \$147,198.

The water sources for the lake are Thunderhawk Creek into the northeast of the lake and some spring flow into the northwest drainage. The lake empties below the spillway and feeds into the Grand River. Ninety percent of the East Lemmon Lake watershed is privately owned agricultural land. The remaining 10% is part of the Grand River National Grassland. The privately owned land is predominantly pasture and row crops, while the National Grassland is exclusively grazing land. Heavy siltation is occurring in the northwest part of the lake. Rooted aquatic vegetation, consisting mostly of cattail and bullrush, appears along most of the shoreline and littoral areas. During mid to late summer large amounts of submerged vegetation are present throughout the lake.

Very little development has occurred at the lake. A dirt and gravel road provides access around the southern half of the lake with a small turnaround on the north side of the dam. Currently, a two track path leads

off the road to the southwest corner of the lake where a break in the vegetation is used as a boat launch. A boat ramp to provide public access was planned for the 2002 fiscal year, but has yet to be completed.

Ownership of Lake and Adjacent Lakeshore Properties:

East Lemmon Lake is owned and managed by the South Dakota Department of Game, Fish and Parks. The dam structure and a small portion of the lake are located on private land.

Fishery Management:

Stocking records indicate fish stockings in East Lemmon Lake since 1939. The lake has suffered frequent winter and summer kills and high densities of undesirable fish. In 1950 a carp trap was installed within the lake and in 1956 and 1957 seining was accomplished in attempt to reduce the overabundant common carp population. Both proved unsuccessful but no carp have been observed during sampling since a substantial winterkill occurred in 1964-65.

Currently, an overabundant white sucker population inhabits the lake. Rotenone treatments were applied within the reservoir in October 1981 in attempt to eradicate the suckers. It was felt, however, that since rotenone was not being used throughout the watershed a complete eradication would not be accomplished.

The lake has been primarily managed as a family fishery for walleye, largemouth bass and yellow perch. Walleye were last stocked in 1993 (Table 1), but due to low returns recent management has been directed at largemouth bass. In 1994 a 15-inch minimum-length-limit was implemented. More recently, in 2003, the limit was dropped from 10 to 5 bass daily along with the rest of the west river public waters.

Table 1. Stocking record for East Lemmon Lake, Perkins County, 1982-2003.

Year	Species	Number	Size
1982	Rainbow trout	68,000	Fingerling
	Walleye	17,000	Fry
	Yellow perch	887	Fingerling
	Northern pike	24	Adult
	Channel catfish	17,500	Fingerling
	Yellow perch	32	Adult
	Largemouth bass	17,000	Fingerling
1983	Walleye	17,000	Fingerling
	Rainbow trout	71,400	Fingerling
	Channel catfish	20,000	Fingerling
1984	Walleye	10,000	Fingerling
1985	Walleye	16,800	Fingerling
	Largemouth bass	11,000	Fingerling
1986	Walleye	16,000	Fingerling
1988	Largemouth bass	18,000	Fingerling
1991	Largemouth bass	18,000	Fingerling
	Walleye	18,000	Fingerling
1993	Largemouth bass	18,000	Fingerling
	Walleye	17,000	Fingerling
1994	Largemouth bass	7,650	Fingerling
1997	Largemouth bass	18,900	Fingerling
1999	Largemouth bass	7,070	Fingerling
2000	Largemouth bass	18,000	Fingerling
2002	Largemouth bass	13,525	Fingerling

Characteristics of Fish Populations:

Fish population surveys were conducted at East Lemmon Lake on July 10-11 and September 23, 2003. July sampling consisted of 2 gill-net nights and 8 trap-net nights while the September sampling was 4 ten-minute night electrofishing stations. Four species of fish were collected throughout the survey. Results from the survey are included in the following tables and text.

Table 2. Catch data from eight, ¾ inch trap nets in East Lemmon Lake, Perkins County, 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	77	9.6 (3.0)	9.6 (3.0)	97 (3)	71 (9)	102.7 (2.9)
White sucker	300	37.5 (14.2)	37.5 (14.2)	100 (-)	99 (1)	--
Yellow perch	2	0.3 (0.2)	0.1 (0.2)	--	--	104.2 (--)
Total	379					

Table 3. Catch data from two 150-ft experimental sinking gill nets in East Lemmon Lake, Perkins County, 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	26	13.0 (12.3)	13.0 (12.3)	92 (9)	77 (14)	105.5 (2.8)
Largemouth bass	1	0.5 (1.5)	0.5 (1.5)	--	--	95.9 (-)
White sucker	81	40.5 (7.7)	40.5 (7.7)	100 (-)	98 (3)	100.8 (0.7)
Yellow perch	3	1.5 (1.5)	1.0 (0.0)	--	--	118.1 (63.1)
Total	111					

Black bullhead

Black bullheads were sampled in rather low abundance during the survey. Trap net CPUE was 9.6, while the gill net CPUE was 13.0 (Tables 2 and 3). Size structure was high with PSD values ranging greater than 90 and RSD-P values greater than 70 for both trap nets and gill nets. Condition values also indicate a healthy bullhead population with mean Wr's greater than 100 for stock-length and larger bullheads. The lack of substock-length bullheads though, suggests poor recruitment in recent years, possibly due to predation or the extremely low water levels and frequent fish kills.

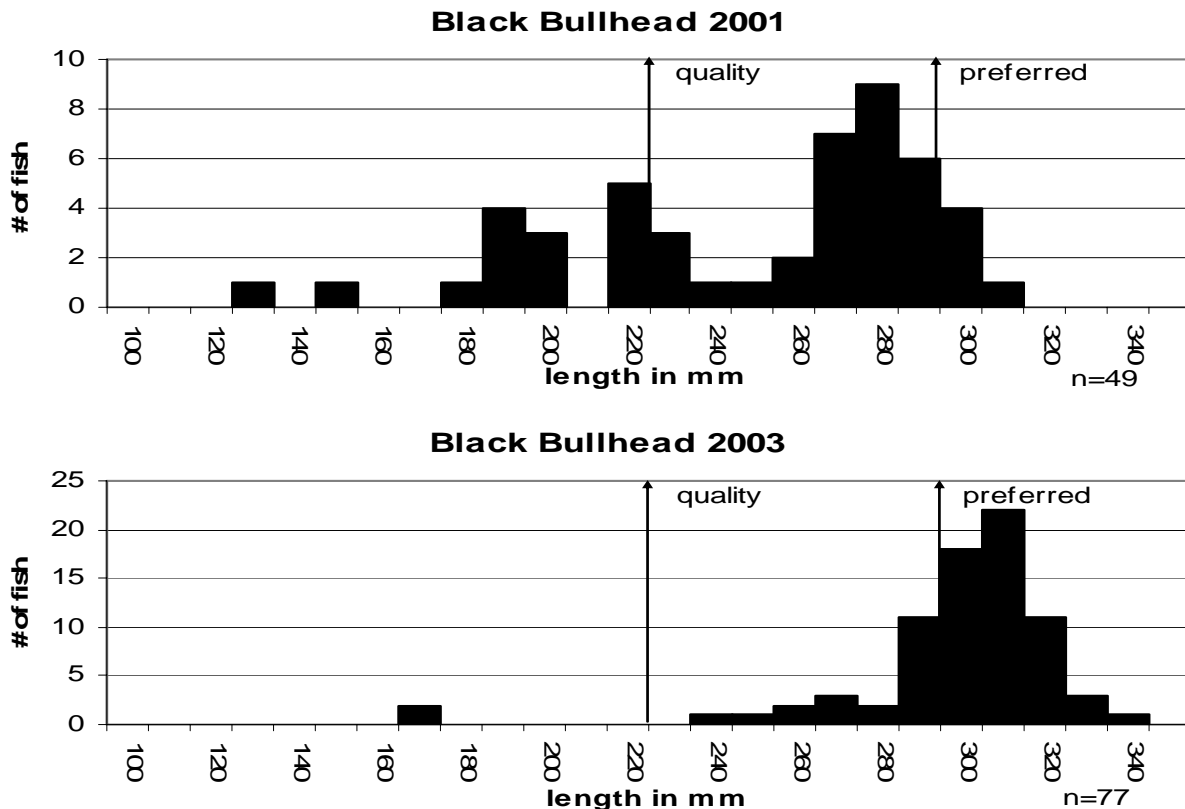


Figure 1. Length histogram of black bullheads collected in frame nets from East Lemmon Lake, Perkins County, 2001 and 2003.

Largemouth bass

Densities of adult largemouth bass densities in East Lemmon are extremely low (Table 3). Night electrofishing yielded a stock-length and larger CPUE of 6.0 bass per hour. Although large numbers of age-0 bass have been observed while electrofishing and seining, recruitment has been extremely variable the last few years. Neither of the 2001 and 2002 year classes showed up during the 2003 sample (Figure 2). Due to reports of algal blooms, the low water level, large amounts of submerged vegetation and high siltation it appears this lake will frequently experience winter and summer fish kills until water levels return. The most probable affect on the bass population will be continued variable recruitment and low densities of larger bass.

Table 3. Catch data for largemouth bass collected by electrofishing in East Lemmon Lake, Perkins County, 2000-2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
2000	113	56.5	53.5	33 (7)	13 (5)	
2001	231	116.7 (43.3)	4.5 (3.1)	100 (-)	33 (31)	112 (10)
2002	61	63.1(28.8)	21.6(15.4)	27 (17)	23 (15)	112 (2)
2003	79	118.5 (88.6)	6.0 (5.7)	100 (-)	100 (-)	120 (5)

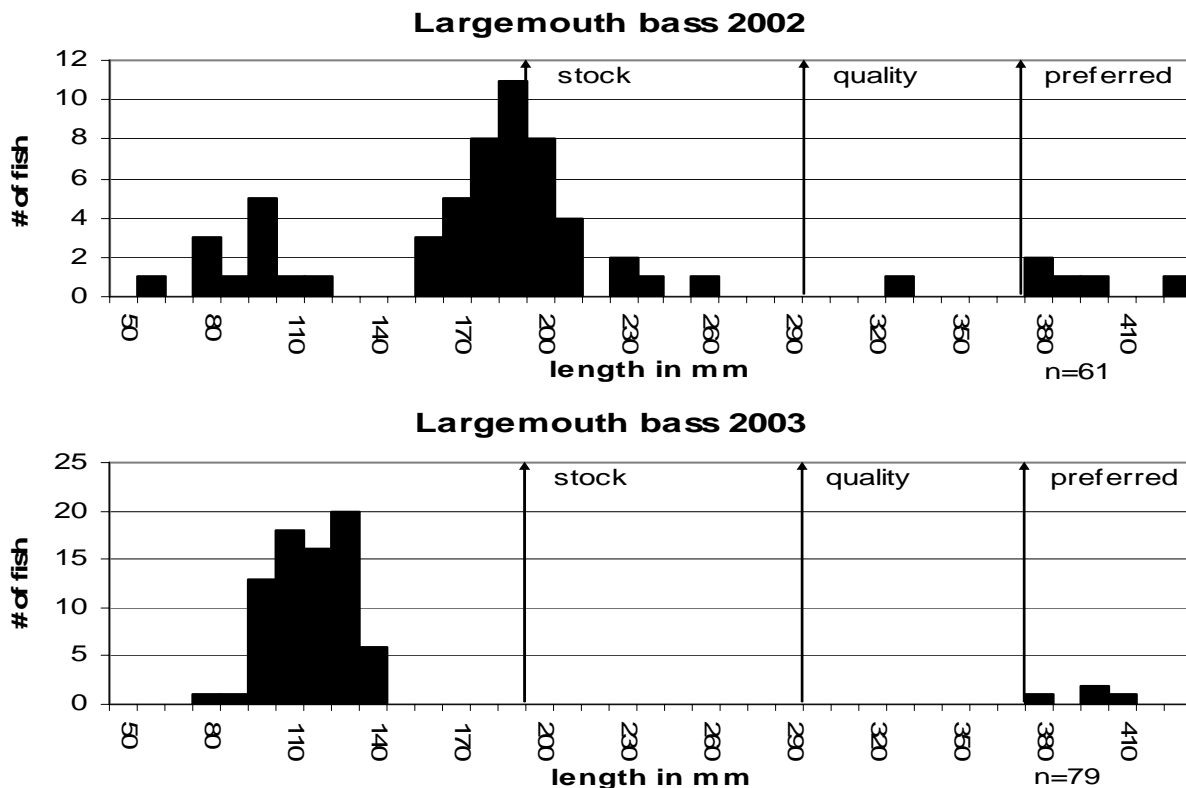


Figure 2. Length frequencies of largemouth bass collected by night electrofishing from East Lemmon Lake, Perkins County, 2002 and 2003.

Yellow perch

Abundance of yellow perch has decreased substantially in the last few years. Mean gill net CPUE in 2001 was 205 versus a mean of 1.5 in 2003. Obviously, fish kills are having a negative affect on the perch population. Due to the low abundance of predators, however, once water levels revive perch should be able to replenish themselves rather quickly.

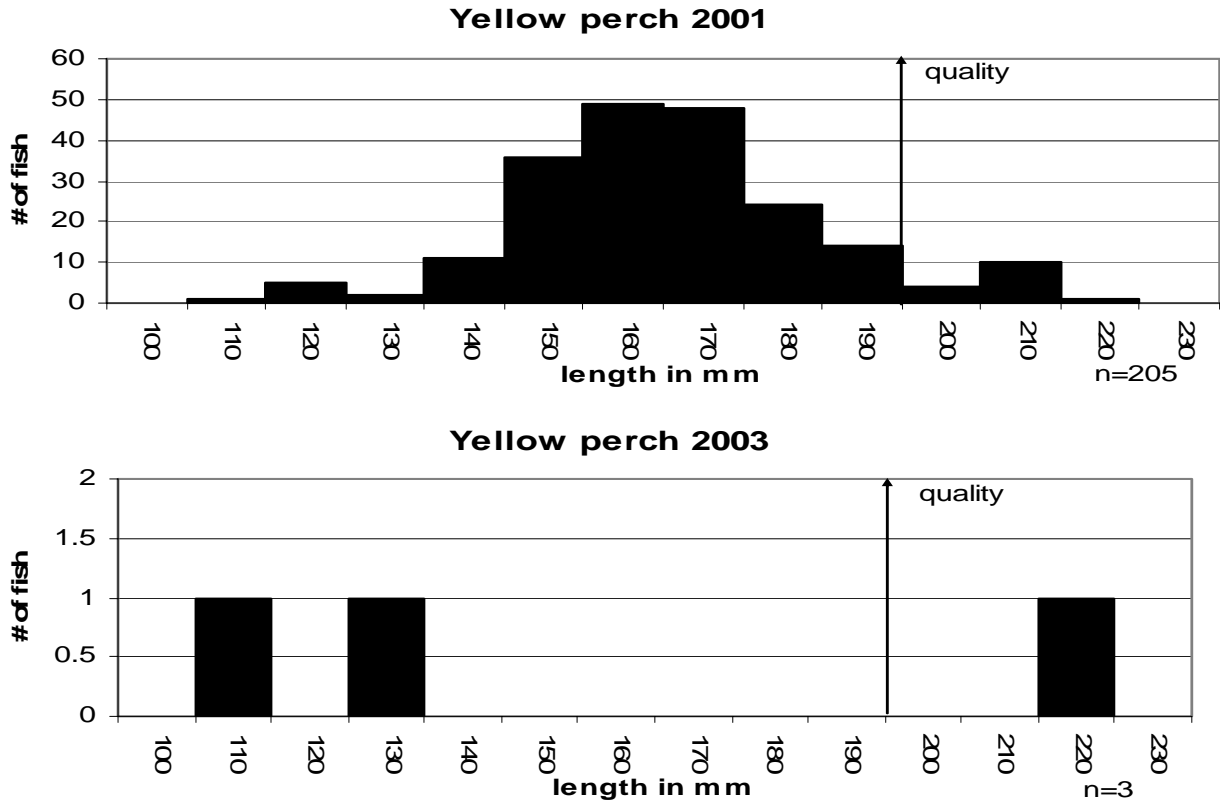


Figure 3. Length histogram of yellow perch collected by gillnets from East Lemmon Lake, Perkins County, 2001, 2003.

White suckers

White sucker abundance is high and they were the most numerous fish species collected in both gill nets and trap nets (Tables 1 and 2). No age and growth analysis was completed but the high size structure suggests a well established adult population able to maintain through the reoccurring fish kills. Lengths of the white suckers sampled in gill nets ranged from 280mm to 460mm (Figure 4).

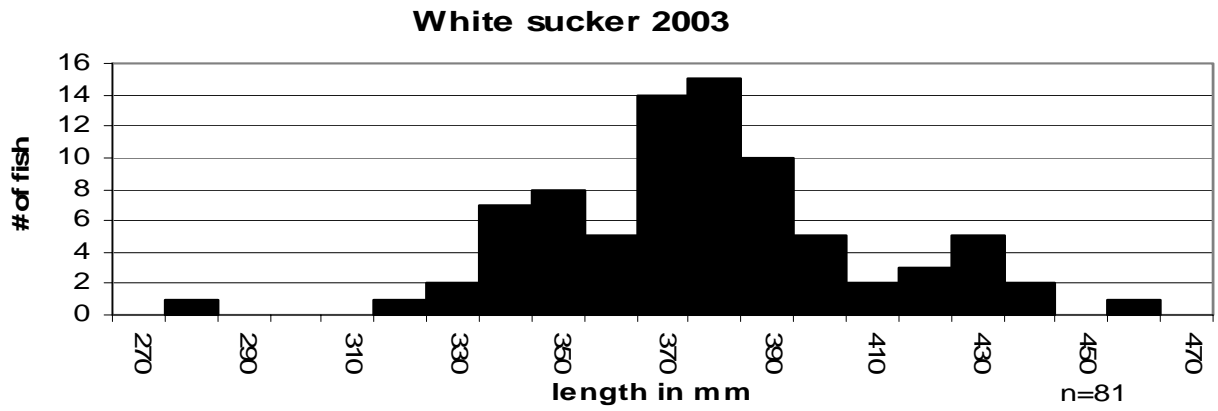


Figure 4. Length histogram of white sucker collected by gill nets from East Lemmon Lake, Perkins County, July 10-11, 2003.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Shadehill Reservoir

County: Perkins

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 4,700 acres

Management Class: WWP

Maximum Depth: 67 feet

Mean Depth: 22 feet

Legal Description: T 21N, R 15E, Sec. 1-4, 8-10, 15-17, 20-23, 26, 27, 34, 35

MANAGEMENT GOAL

To optimize angling opportunities at Shadehill Reservoir.

OBJECTIVES AND STRATEGIES

- Objective 1.** To increase and maintain a walleye fishery with a minimum gill-net CPUE for stock-length walleye of 20, maintain a PSD range of 30-60, increase RSD-P to 10 or greater, and increase growth rates to near or at the regional mean.
- Strategy 1a. Evaluate the walleye population and walleye length limits by conducting annual lake surveys. If the 14-inch minimum and 1 over 20 daily limit appears unable to meet criteria of Objective 1 then explore other possible regulations (i.e. protected length group with one large fish, etc).
- Strategy 1b. Stock walleye fingerlings into voids of natural reproduction or when supplementing the population is needed.
- Objective 2.** To maintain or supplement the gizzard shad population through adult stockings.
- Strategy 2a. Evaluate adult gizzard shad over-winter survival through trap net and gill net catch during annual lake surveys and evaluate the importance of stocking by marking stocked shad with fin clips.
- Strategy 2b. Stock 100 to 200 adult gizzard shad annually to supplement the existing population until it is determined if the population can sustain itself in mild winter years.
- Objective 3.** To maintain and improve the smallmouth bass fishery in the reservoir.
- Strategy 3a. Evaluate the smallmouth population through occasional night electrofishing (i.e. once every 5 years), standard population surveys, creel surveys, and/or anecdotal catch information from local WCO's and anglers. Explore more restrictive regulations or stock fingerlings as deemed necessary to improve the fishery.
- Objective 4.** Maintain an angler satisfaction rate at 73% or greater. Gigliotti (2000) reported a statewide angler satisfaction level for SD resident and non-resident anglers of 73.4 % in 1999.

Strategy 4a. Conduct a roving creel survey every 5 to 10 years to determine angler satisfaction and attitudes, and catch and harvest rates.

Objective 5. Keep the Perkins County Conservation Officer, the Bureau of Reclamation, and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Strategy 5a. Provide lake survey reports, creel reports, and management plans when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys annually utilizing twelve 24-hour frame net sets, a minimum of two 300-foot experimental gill net sets. Sample prey fish by either four seining stations of two to four pulls per station or 6 ten minute day electrofishing stations.
2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
3. If netting reveals walleye CPUE less than the stated objective values then stock 200,000 to 250,000 small fingerlings (or numbers as available) to supplement the population.
4. Conduct a creel survey every 5 to 10 years to determine angler affects and attitudes about the fishery and the success of management activities.
5. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.

INVENTORY

Shadehill Reservoir is located approximately 12 miles south of Lemmon in Perkins County. Construction of the dam began in April 1949 and was completed in 1951. Impoundment of the reservoir began during July in 1950. The primary functions of the reservoir are irrigation and flood control in the Grand River Basin. Irrigation water is stored for 6,700 acres and diversion occurs directly from the reservoir or from the Grand River downstream. Originally, over 24 miles of irrigation canals diverted water throughout the area. Irrigation requests have decreased substantially but continue to be a primary responsibility of the reservoir.

Shadehill Reservoir has a surface area of around 4,690 acres when full. Volume capacity of the reservoir is 102,488 acre feet (at elevation 2,272 mean sea level). The reservoir is formed by an earthfill dam on the mainstem Grand River just below the confluence of the North Fork Grand River and South Fork Grand River. The watershed is approximately 3,400 square miles and consists of 75 percent pastureland, 20 percent cropland and 5 percent forest.

Annual water level fluctuations frequently limit the amount of emergent and submergent vegetation at the reservoir. Plant species common to the reservoir

are coontail, common cattail, potomageton spp. and willow. Shoreline vegetation is occasionally flooded around the entire reservoir in early spring but water levels typically are not maintained throughout the rest of the year. The fluctuating water levels provide good habitat during spawning but poor habitat at crucial times throughout the rest of the year for recruitment to occur.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

Shadehill Reservoir and Shadehill Dam are owned by the U.S. Bureau of Reclamation (BOR). The BOR performs operation and maintenance of the dam and the South Dakota Department of Game, Fish and Parks manages much of the land, around the reservoir. Responsibilities of the Game Fish and Parks include the State Park and Recreation Area, Game Production Areas and Waterfowl Production Area bordering the reservoir. Total acreage managed by the Game, Fish and Parks is 11,150 acres, of which 3,000 acres make up the Shadehill State Park, 4,466 are in Game Production Areas and 560 are classified as a Waterfowl Production Area.

The Parks Division of the South Dakota Game, Fish and Parks Department maintains the facilities around the reservoir. Facilities include a 52 site campground with electricity, bath house and dump station; picnic area; swim beach with changing area; two 4-man camping cabins; one two-bedroom lodge; three boat ramps and a fish cleaning station. Access to the facilities requires a state park permit.

Fishery Management:

Management of the Shadehill Reservoir fishery has primarily been as a walleye and smallmouth bass fishery. Beginning in January 2003, a daily limit of only one walleye over 20-inches was added to the 14-inch minimum-length-limit. It is hoped the restriction on larger walleye will distribute these fish among anglers throughout the year, as well as, impress the value of larger walleye and promote higher release rates.

Smallmouth bass have also been a popular sportfish at the reservoir. Management has been limited to stockings (Table 1) with little evaluation of the smallmouth fishery other than anecdotal information from the local conservation officer and anglers.

Since construction of the lake, stockings (Table 1) have been the primary fisheries management tool. The more recent fisheries management has included stockings of gizzard shad in an attempt to provide a reservoir wide forage base. Depending on availability, between 57 and 251 prespawn shad have been stocked annually to supplement the adult population.

Table 1. Stocking record for Shadehill Reservoir, 1994-2003.

Year	Species	Number	Size
1994	Walleye	200,000	Fingerling
1995	Rainbow trout	25,000	Fingerling
1996	Rainbow trout	25,000	Fingerling
	Smallmouth bass	50,550	Fingerling
	Walleye	393,000	Fingerling
1997	Rainbow trout	24,053	Fingerling
	Smallmouth bass	57,300	Fingerling
	Walleye	194,772	Fingerling
1998	Smallmouth bass	51,666	Fingerling
	Yellow perch	400	Adult
1999	Gizzard shad	96	Adult
	Smallmouth bass	50,000	Fingerling
	Walleye	150,918	Fingerling
	Yellow perch	6,750	Adult
2000	Gizzard shad	251	Adult
	Smallmouth bass	30,590	Fingerling
2001	Gizzard shad	57	Adult
	Walleye	138,075	Fingerlings
2002	Walleye	50,000	Fingerlings
2003	Gizzard shad	251	Adult

Fish Population Characteristics:

Seining, trap netting and gill netting are completed annually at Shadehill Reservoir. Seining in 2003 consisted of 4 stations with 2 hauls per station. The 2003 netting survey consisted of 4 gill net nights and 6 trap net nights. During 2003, eleven species of fish were collected while seining and sixteen species were collected while netting. The results of

selected species and comparisons with previous years are included in the following tables, figures, and text.

Black crappies

Black crappie were the most numerous fish collected in trap nets in 2003. Trap net CPUE has been increasing and was 9.5 per net for stock-length and larger fish in 2003 (Table 2). Stock indices have been variable due to small sample sizes but also increased in 2003 with the larger sample. Mean condition of crappies has remained high with a mean W_r for stock-length and larger fish of 101.8. The length frequency shows the 2001 year class ranges from 170 to 210 mm (Figure 1).

Table 2. Composite listing of trap-net catch for black crappie collected from Shadehill Reservoir, 2000-2003.

Year	N	CPUE-S	PSD	RSD-P	W_r -S
2000	16	1.3 (0.8)	69 (21)	50 (23)	101.6 (8.7)
2001	16	1.4 (0.5)	47 (23)	20 (19)	98.8 (3.8)
2002	42	1.5 (0.8)	10 (8)	0 (na)	99.1 (0.5)
2003	57	9.5 (3.3)	51 (11)	2 (3)	101.8 (1.4)

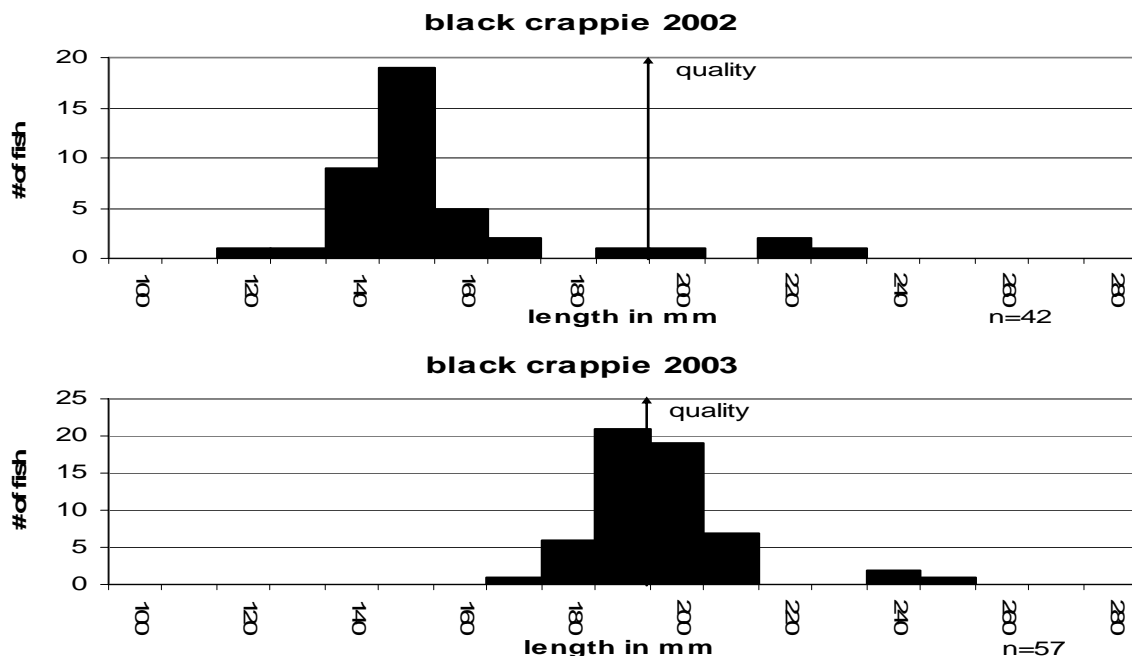


Figure 1. Length frequency histogram for black crappie from frame nets at Shadehill Reservoir, 2002-2003.

Channel Catfish

Channel catfish continue to be the most abundant species sampled in gill nets. Although CPUE increased slightly it has remained relatively the same over the last few years (Table 3). Stock density indices have also remained similar. The proportion of quality length fish has continued to range from around 30 to 50 while preferred-length fish appear to be very low in number. The reason that the Shadehill catfish seldom reach larger sizes or are sampled in our gear remains unexplained. Possibly, our gear does not sample the larger fish or growth rates are extremely slow. Age and growth has never been completed for Shadehill catfish.

Condition of the catfish continues to be rather low with a mean W_r for stock-length and larger fish of 90.6. This population appears to remain relatively steady with very little changes from year to year.

Table 3. Composite listing of annual gill net sample data for channel catfish from the Shadehill Reservoir, Perkins County, 1999-2003.

Year	N	CPUE	PSD	RSD-P	W_r -S
1999	261	29.0(12.0)	27(5)	0(1)	85.5(0.1)
2000	163	27.2(4.6)	32(6)	1(1)	83.4(0.5)
2001	97	19.4(11.3)	36(9)	0(na)	96.5(0.5)
2002	117	29.3(17.3)	56(0)	0(na)	82.5(1.4)
2003	139	34.8(14.9)	48(9)	0(na)	90.6(0.9)

Gizzard Shad

The adult shad stocked this spring appear to have had an excellent spawn (Figure 2). CPUE was 22.5 per gill net and age-0 shad made up 19.0 of this catch. For comparison, the 2002 CPUE was 0.0. Shad should provide excellent forage for Shadehill's predatory fish. The northern latitude of South Dakota and subsequent cold winter water temperatures should keep over-winter mortality of gizzard shad high. The high winter mortality is desirable to keep densities of adult shad low while maintaining a high reproductive potential.

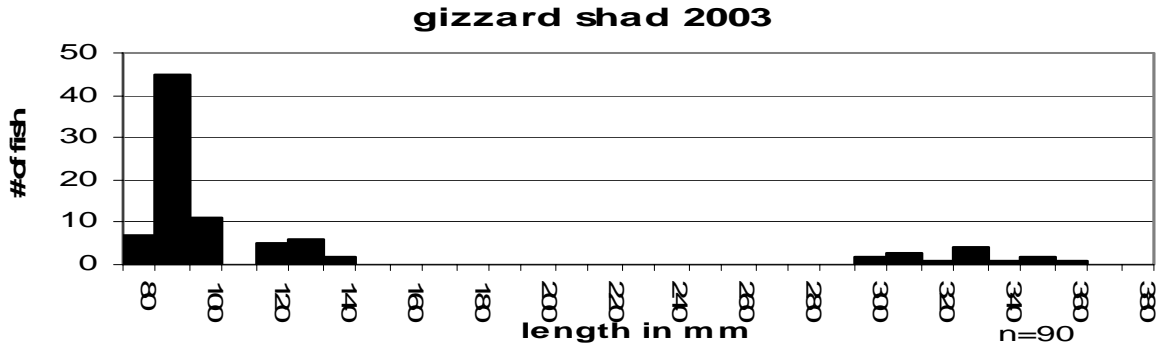


Figure 2. Length frequency histogram for gizzard shad from gill nets in Shadehill Reservoir, 2003.

Walleye

The 2003 walleye sample showed a slight increase in abundance over last year's sample, most being age-1 fish (Table 4). Gill net CPUE was 17.5 in 2003 compared to 9.0 in 2002; catch of stock-length and larger fish, however, was nearly identical with a 2003 CPUE of 9.0 compared to 8.5 in 2002.

Numbers of preferred-length walleyes (over 20 inches) remain low. RSD-P in 2003 was 3, which is the highest recorded in recent years (Table 4). Length frequencies continue to show good numbers of walleye smaller than 14 inches in length. A daily one walleye over 20 inches regulation was implemented in January of 2003, hopefully protecting some of the larger walleye and helping improve size structure. Growth was slow but appears to be improving in recent years (Table 5), possibly a result of the gizzard shad introduction.

Table 4. Composite listing of annual gill net data for walleye collected at Shadehill Reservoir, Perkins County, 1998-2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P	Wr-S
1998	56	6.2		5	0	75.7(1.2)
1999	64	7.1		0	0	81.6(0.3)
2000	122	20.3(6.9)	20.3(6.9)	9(4)	2(2)	81.2(0.2)
2001	93	18.6(10.1)	17.4(10.2)	31(8)	0(na)	83.0(1.0)
2002	42	10.5(5.1)	8.5(3.4)	82(12)	0(na)	83.2(1.2)
2003	70	17.5(7.2)	9.0(5.7)	31(14)	3(4)	84.6(1.2)

Table 5. Shadehill Reservoir walleye age data and the Region 1 and South Dakota walleye mean length-at-ages (Willis et al. 2001).

Year	Age									
Class	Age	N	1	2	3	4	5	6	7	8
2002	1	25	168							
2001	2	16	166	247						
2000	3	8	132	270	324					
1999	4	1	117	201	308	350				
1998	5	5	117	183	260	369	427			
1997	6	2	122	188	227	300	409	456		
1996	7	2	135	171	215	283	336	382	432	
1995	8	1	126	235	289	378	378	423	475	501
Mean (SE)		60	135(7)	213(14)	271(18)	327(16)	387(20)	420(21)	453(22)	501(0)
Region 1			164(17)	260(22)	332(27)	385(32)	444(42)			
South Dakota			168(3)	279(6)	360(7)	425(8)	490(9)			

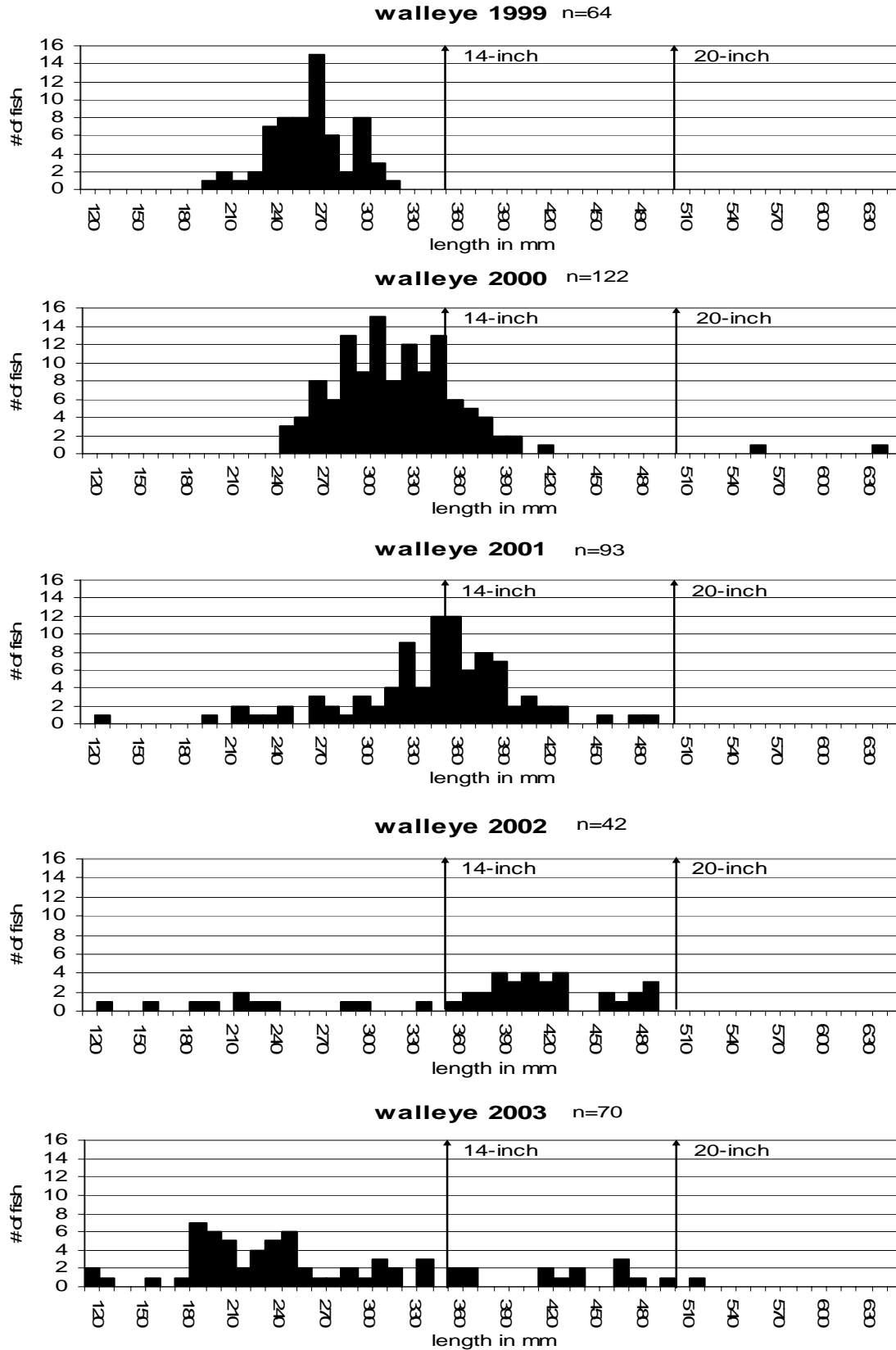


Figure 3. Length frequency histogram for walleye from gill nets, Shadehill Reservoir, 2000-2003.

LITERATURE CITED

Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom.
2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Wanalain Lake

County: Brule

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 79 Acres

Management Class: WWP

Maximum Depth: 10 Feet

Mean Depth: 6.2 Feet

Legal Description: Sections 17, 20 & 21, Township 104 North, Range 70 West

INVENTORY

Wanalain Lake is a seventy-nine acre impoundment located three miles west and two miles north of Pukwana in north central Brule County. Wanalain derived its name from the last four letters of Pukwana and Chamberlain, the towns that the lake is located between. The artificial impoundment was created in 1936 with the completion of a rolled earth dam on American Creek by the Works Progress Administration (WPA). The dam was built on land owned by the State of South Dakota due to a foreclosure in 1929. The State still owns the land on which the dam grade and spillway were constructed though an easement to develop a park was granted to Brule County in 1937. The remaining land surrounding Wanalain Lake is privately owned or within the railroad right-of-way.

The watershed for Wanalain Lake is relatively small at 3,200 acres or approximately 5 square miles. Topography varies from nearly level to moderately sloping. Soils are primarily clay, silt and loam. Native grasses that are utilized for hay and pastureland primarily surround the immediate shoreline of Wanalain. The remainder of the watershed is 30% cultivated agricultural land, 50% native grass utilized as pasture or hayland and 20% marshland. Moderate to heavy siltation has occurred throughout Wanalain and is most apparent in the upper 1/3 of the lake. Siltation has increased vegetation growth to nuisance levels and reduced the total water volume of the lake. Cattails and bulrush surround about 80% of the lake's shoreline. Submergents are found throughout the lake to a depth of 6 feet and often reach nuisance levels during summer months. From the outlet of Wanalain water flows down American Creek and enters Lake Francis Case on the Missouri River at the town of Chamberlain. Access to Wanalain is poor with a dirt/gravel township road leading to the dam grade from the south. There are no boat ramps or other user facilities at Wanalain Lake.

Wanalain Lake has been utilized as a public fishery since the time of its construction in 1936. The first reported fisheries activities at the lake were the stocking of bullhead, crappie and yellow perch in 1935-1937. Largemouth bass and walleye were added in the early 1940s. It is indicated in the lake file that during the late 1940s and early 50s, Wanalain provided an excellent fishery for walleye, largemouth bass and black crappie. In 1958 locals were reporting that the fishing had been poor for the past several years and Game, Fish and Parks completed a lake investigation to evaluate the current fishery. During the 1958 survey it was discovered that the majority of the fish population in Wanalain Lake was made up of small crappies, bullheads and carp. The lake was chemically eradicated later that summer, however there are no records of fish being restocked until the early 1960s. Very little information is available about the fishery at Wanalain from 1958 to 1985. Several stockings of walleye, northern pike, black crappie and perch were completed in the 1980s, however the fishery still remained fair to poor throughout much of this time. A fish population survey conducted in 1985 found stunted black bullhead, bluegill, and black crappie as the only fish present in Wanalain. Largemouth bass and northern pike have been stocked on several occasions from 1986 to present in an attempt to increase the predator density and develop a more balanced population. Though latest data indicates improvement in the fish community in Wanalain, it has not consistently maintained a good fishery for several years.

Stocking record for Potts Dam, Potter County, 1983 to present

YEAR	NUMBER	SPECIES	SIZE
1983	500	BLC	ADT
1984	40,000	NOP	FRY
1985	74	NOP	ADT
1886	1,100	LMB	FGL
1986	4,000	NOP	FGL
1987	4,000	LMB	FGL
1987	4,000	NOP	FGL
1990	4,000	LMB	FGL
1990	110	LMB	ADT
1991	4,000	LMB	FGL
1992	4,000	LMB	FGL
1992	4,000	NOP	FGL
1993	7,600	NOP	FGL
1994	3,950	LMB	FGL
1996	191	LMB	ADT
1997	43	LMB	ADT
1997	177	LMB	ADT
1999	75	LMB	ADT
1999	280	LMB	ADT
1999	7,900	LMB	FGL
1999	7,900	NOP	FGL
2000	50	LMB	ADT
200	150	LMB	ADT

The fish population at Wanalain Lake was most recently surveyed July 14-16, 2003 using ten, overnight, ¾-inch frame nets. No experimental gill nets were set in Wanalain in 2003, and vegetation growth and low water levels prevented fall electrofishing from being completed.

**Total catch of ten, overnight ¾-inch frame nets at Wanalain Lake, Brule County,
July 14-16, 2003**

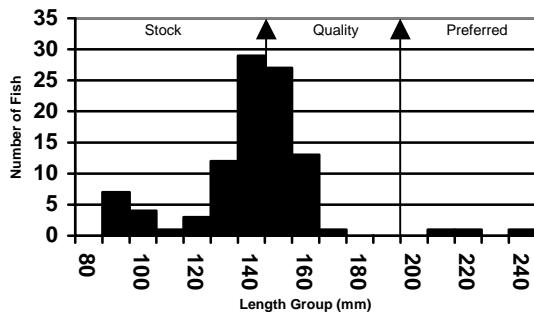
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	539	75.4	53.9	± 52.2	338.1	23	0	79
Bluegill	157	22.0	15.7	± 11.0	23.7	44	3	110
Largemouth Bass	6	0.8	0.6	± 0.4	0.2	40	20	109
Black Crappie	5	0.7	0.5	± 0.5	9.7	--	--	101
Yellow Perch	4	0.6	0.4	± 0.3	0.2	--	--	92
Hybrid Sunfish	3	0.4	0.3	± 0.3	0.0	--	--	--
Northern Pike	1	0.1	0.1	± 0.1	0.6	--	--	62

* Five year mean (1984, 1991, 1994, 1997, and 1999)

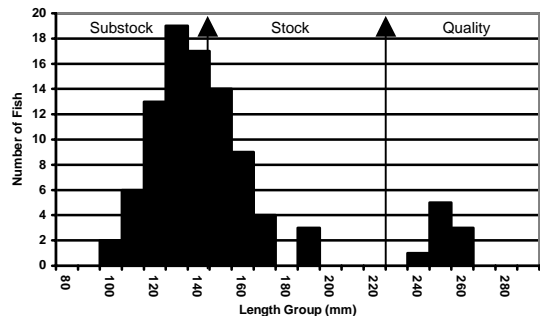
Black Bullhead remains the most abundant species sampled in Wanalain Lake in 2003. The positive side of this is that the CPUE of 53.9 is the second lowest in survey history and well below the five year mean of 338.1. The majority of the bullheads sampled were below stock length. Stock length and greater fish had a PSD of 23. Bullhead condition was poor with a Wr of 79.

The second most frequently sampled species in Wanalain Lake in 2003 was bluegill. The 2003 CPUE of 15.7 was below the five-year mean of 23.7 but an increase from the previous surveys 10.4. Condition was excellent with a Wr of 110. Even with the excellent condition, growth was slower than the state and regional averages. Size structure of the bluegill population was good with a PSD of 44 and an RSD-P of 3.

**Length frequency histogram for
bluegill sampled in Wanalain Lake,
Brule County, 2003**



**Length frequency histogram for
black bullhead sampled at Wanalain
Lake, Brule County, 2003**



Other species sampled during the 2003 survey include black crappie, yellow perch, hybrid sunfish, largemouth bass, and northern pike. Electrofishing was not completed due to low water levels and excessive weed growth, but extremely clear water during the netting portion of the survey allowed crews to view several smaller bass throughout the lake. Hopefully this indicates an increasing population that will help control bullhead densities in the future. Wanalain Lake experienced a partial summer kill in 2003. Several northern pike were observed dead along the shoreline at the time. The kill was a result of a turnover after a summer storm and a die off of existing vegetation. With low water levels continuing at Wanalain, the potential for more fish loss due to summer or winter kill is likely.

MANAGEMENT GOAL

To manage the fishery at Wanalain Lake to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain largemouth bass population with a nighttime electrofishing CPUE of 40/hour and a PSD of 35 or greater.

Strategy 1a. Monitor largemouth bass population by means of standard survey methods to determine density, age, growth, size structure, and condition.

Strategy 1b. If winterkill occurs, stock with largemouth bass adults and fingerlings.

Objective 2. Decrease black bullhead densities to a CPUE of 50 or less.

Strategy 2a. Maintain largemouth bass population at a level that effectively limits bullhead recruitment.

Strategy 2b. Utilize Department crews to physically remove black bullheads.

Objective 3. Maintain bluegill population at current densities with growth and condition at or above the state average.

Strategy 3a. Maintain largemouth bass population at a density that prevents bluegill from becoming overpopulated, slowing growth.

Strategy 3b. Monitor bluegill population utilizing standard adult survey methods to determine density, growth and condition.

Objective 4. Inform, receive, and use continuing input from the public and other agencies to assist in the management of Wanalain Lake.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys in 2005 and 2008 utilizing eight, 24 hour , ¾ inch frame net sets, and at least one hour of nighttime electrofishing to monitor all fish species.
2. If winterkill occurs, stock largemouth bass fingerlings at a rate of 100/acre and largemouth bass adults at a rate of 10/acre and 2005.
3. If survey results indicate a bluegill CPUE of 10 per frame net or less, stock with adults at rate of 10/acre.
4. If electrofishing results indicate a CPUE of 20 or less largemouth bass/ hour, stock with bass adults at a rate of 10/acre.
5. Physically remove all black bullhead captured at time of 2005 and 2008 surveys.
6. The local Conservation Officer and other GF&P staff should solicit input from all public sources and provide information to the Regional Fisheries Manager on a regular basis.
7. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2008.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Academy Lake (17-4)

County: Charles Mix

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 31 Acres

Management Class: WWM

Maximum Depth: 10 Feet

Mean Depth: 5 Feet

Legal Description: Section 22, Township 100, Range 70

INVENTORY

Academy Lake is a 31-acre impoundment located 1.5 miles west and 0.5 mile north of the town of Academy in north central Charles Mix County. The lake and town were named after the Christian school that was founded in the area. The artificial impoundment was created when the Works Progress Administration (WPA) constructed an earthen dam on the upper end of Snake Creek. Though the exact date of construction is unknown, easements were signed in October of 1938 to allow for the construction of the lake and dedicate for public use a strip of land twelve feet above the high water mark. These easements are recorded in the Charles Mix County Register of Deeds office, Book 59, page 341. The south and west half of the lake lies within a 75-acre Game Production Area owned by the SD Dept. of Game, Fish & Parks. The remainder of the lake is privately owned.

The watershed for Academy Lake is approximately 15 square miles or 9,600 acres. Topography varies from gently rolling to steep upland slopes. Soils in the watershed are primarily loamy clays. The immediate shoreline of Academy Lake is 100% grassland with the east and north edges often heavily grazed. The remainder of the watershed is 80% cultivated cropland, 15% pastureland, and 5% being the Platte Colony that is directly above the lake and has several concentrated livestock feeding areas. Moderate siltation has occurred throughout Academy Lake decreasing total water volume. Heavy nutrient loads have entered the lake from the livestock feeding areas directly above the lake on the watershed. These increased nutrient levels have resulted in heavy vegetation growth. Emergent vegetation, primarily cattail, surrounds the entire lake. Submergent vegetation is found throughout the lake and grows to a depth of 5 feet. From the outlet of Academy Lake water flows down Snake Creek to Lake Francis Case on the Missouri River. Access to Academy Lake is via a trail from a gravel county road. The “natural” boat ramp is covered with silt and only usable when the lake is at near full levels. There are no other public use facilities at Academy Lake.

Very little information other than stocking records are available concerning Academy Lake prior to 1970. The first recorded stocking of bullheads took place in 1936 followed by largemouth bass fingerlings being stocked in 1938. Largemouth and bullheads were stocked in 1939, again in 1940, and on several occasions until 1955. No recorded fish stockings occurred between 1955 and 1979. The first documented lake survey was conducted at Academy Lake in 1971. Not surprisingly, the only species to be stocked, largemouth bass and bullhead, made up the entire fish population. Bass continued to maintain good density and provided fishing opportunity throughout the 1970s, but by 1985 they had nearly disappeared from the lake's fish population. Numerous attempts to rebuild the largemouth bass population through stocking of fingerlings and adults were completed during the 1990s with poor results. Today black bullheads dominate the fish population with a few green sunfish also being present.

Stocking record for Academy Lake, Charles Mix County

YEAR	NUMBER	SPECIES	SIZE
1936	19,500	BLB	FGL
1938	5,200	LMB	FGL
1939	3,000	BLB	ADT
1939	2,100	LMB	FGL
1940	6,000	BLB	ADT
1940	300	LMB	ADT
1942	1,600	LMB	FGL
1944	2,000	BLB	ADT
1946	5,000	BLB	ADT
1948	8,000	BLB	ADT
1951	1,250	LMB	ADT
1955	5,000	BLB	ADT
1979	1,250	LMB	FGL
1981	2,000	LMB	FGL
1986	1,250	NOP	FGL
1989	2,500	LMB	FGL
1990	2,500	LMB	FGL
1991	1,250	LMB	FGL
1992	1,250	LMB	FGL
1996	150	LMB	ADT
1996	3,100	LMB	FGL
1997	3,100	LMB	FGL
1998	150	LMB	ADT
1998	3,100	LMB	FGL
1999	276	LMB	ADT
1999	3,100	LMB	FGL

The most recent lake survey was conducted at Academy Lake during June of 2001. Eight, overnight frame net sets were utilized to sample the fish population. Electrofishing was not completed due to low water levels preventing launching and loading the electrofishing boat. No experimental gill nets were set during the 2001 survey.

Black bullhead was the dominant species sampled during the 2001 survey with a CPUE of 59.8. PSD was 43 and RSD-P was 2. Seventy-six percent of the bullheads sampled were under stock length. Fish greater than stock length had a Wr of 85. Though these bullhead numbers seem high, they are significantly lower than had been recorded during the 3 surveys conducted during the 1990s.

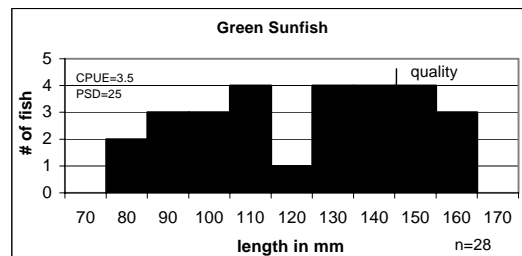
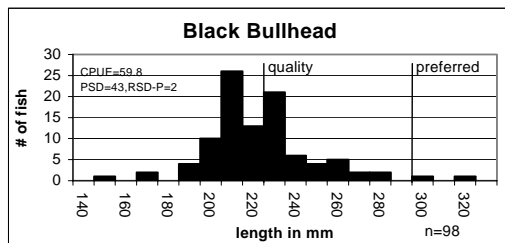
The green sunfish population remained stable with a CPUE of 3.5. PSD was 25. Condition was excellent with a Wr of 108. These numbers are very similar to those recorded during prior surveys. One largemouth bass was sampled in the frame nets. With the reduction in the number of bullheads, it is hoped that the adult bass stocking in 1999 may have been effective in establishing a strong largemouth yearclass in 2000.

Total catch of eight, 24 hour, frame-nets at Academy Lake, Charles Mix County, June 11-13, 2001.

Spec.	No.	%	CPUE (80%CI)	PSD (90%CI)	Stock Mean Wr (90%CI)
BLB	478	94.3	59.8(22.6)	43(8)	84.8(0.5)
GSF	28	5.5	3.5(2.1)	25(14)	108.1(0.8)
LMB	1	0.2	0.1(0.2)	--	92.8(--)

Total 507

Length frequencies for Black Bullhead and Green Sunfish at Academy Lake, 2001



MANAGEMENT GOAL

To manage the fishery at Academy Lake to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Decrease black bullhead densities to a trap-net CPUE of 25 or less.

Strategy 1a. Increase predator densities to a level that effectively limits bullhead recruitment.

Strategy 1b. Physically remove black bullheads to reduce densities.

Objective 2. Establish Academy Lake's largemouth bass population at a nighttime electrofishing CPUE of 20 or greater

Strategy 2a. Stock largemouth bass adults if necessary to reestablish population.

Objective 3. Develop a yellow perch population with a CPUE of between 6 and 12 with condition and growth at or above the state average.

Strategy 3a. Introduce yellow perch to Academy Lake by stocking adults.

Objective 4. Inform, receive, and use public input to assist in the management of Academy Lake.

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2004 and 2007 utilizing eight, 24-hour frame-net sets and one hour of nighttime electrofishing to monitor all fish species.

2. Utilize Department crews to remove all black bullheads captured during the 2004 survey.

3. Stock perch adults at a rate of 10/acre in 2005.

4. The local Conservation Officer and other GF&P staff should solicit input from all sources and provide information to the Regional Fisheries Manager on a timely basis.

5. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Geddes Lake (17-3)

County: Charles Mix

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 64 Acres

Management Class: WSP

Maximum Depth: 9 Feet

Mean Depth: 6 Feet

Legal Description: Section 25, Township 97, Range 67

INVENTORY

Geddes Lake is a sixty-four acre impoundment located 4.5 miles south of the town of Geddes in central Charles Mix County. Geddes Lake was named after the town of Geddes that derived its name from D.C. Geddes, an official with the Milwaukee Railroad. The artificial impoundment was created in 1939 by the Works Progress Administration (WPA) with construction of an earthen dam on Pease Creek. To allow for the creation of the dam and lake, two public use easements were granted to the State of South Dakota for the lake and a twelve-foot strip of land above the high water contour. These easements are recorded in the Charles Mix County Register of Deeds office, Misc. Book 15, pages 201 and 202. The immediate shoreline surrounding Geddes Lake is privately owned.

Geddes Lake is located on the upper end of the Pease Creek watershed, a tributary of the Missouri River. The watershed above Geddes Lake covers approximately 68,000 acres or 106 square miles. Topography varies from steep to gently rolling slopes with sandy clay soils. Several small dams and wetlands are found throughout the watershed. The immediate shoreline of Geddes Lake consists mainly of native grasses and wooded areas. The remainder of the watershed is made up of approximately 60% cultivated cropland and 40% pasture and hayland. Moderate to heavy siltation has occurred in the entire lake resulting in a significant loss of the lakes total holding capacity. Siltation from the watershed has also created high nutrient levels resulting in the lake having a hyper-eutrophic state. Emergent vegetation, mainly cattail and bulrush is found around the perimeter of the entire lake. Submergent vegetation is common and found to a depth of 5 feet. From the outlet of Geddes Lake water flows down Pease Creek to Lake Francis Case on the Missouri River. Access to the east side of Geddes Lake is good with a gravel trail from SD Hwy. 50. The concrete boat ramp is in good condition but only useable when the lake is nearly full. There are no other public use facilities at Geddes Lake.

Geddes Lake has provided a recreational fishery since the time of its construction. The first recorded fish stockings were of largemouth bass fingerlings in 1943, 1945 and 1946. Black bullheads and bluegills were stocked in 1948. Stockings of all three species continued in the early 1950s until common carp densities got high and became an extreme detriment to the fishery. In an attempt to eliminate the carp population the lake was drained in 1958. After the lake filled in 1959 a lake survey was completed to document any remaining fish species. Largemouth bass and black bullheads were stocked in 1961. During the 1960s and 70s fishing was documented as fair to good for bass, bluegill and bullheads. By the early 1980s carp and bullheads once again dominated the population. The lake and a portion of the watershed were chemically eradicated during the fall of 1984. The following year Geddes was stocked with bluegill, channel catfish, largemouth bass and rainbow trout. Since the time of the eradication Geddes Lake has been stocked on several occasions with bass, but the shallow nature of the lake creates frequent stressful periods for bass and the reestablishment of a fishery has been only moderately successful.

Stocking record for Geddes Lake, Potter County 1980 - 2003

YEAR	NUMBER	SPECIES	SIZE
1980	2,000	LMB	FGL
1982	800	LMB	FGL
1985	380	BLG	ADT
1985	17,500	BLG	FGL
1985	7,000	CCF	FGL
1985	138	LMB	ADT
1985	17,500	LMB	FGL
1985	24,385	RBT	FGL
1986	2,000	CCF	FGL
1986	14,000	LMB	FGL
1987	7,000	LMB	FGL
1988	6,400	FHM	ADT
1988	3,500	LMB	FGL
1988	250	YEP	FGL
1989	1,000	BLG	JUN
1989	15	LMB	ADT
1989	300	LMB	FGL
1989	200	LMB	JUN
1990	328	YEP	FGL
1991	1,000	LMB	FGL
1999	6,400	LMB	FGL

The most recent fish population survey was conducted at Geddes Lake during June of 2001. Eight, overnight frame net sets were used to sample the fish population. Daytime electrofishing was attempted but water clarity severely hampered the efforts. No experimental gill nets were set in Geddes Lake in 2001.

Black Bullhead comprised nearly 95% of the total number of fish sampled in the 2001 survey. CPUE was 448.3, however most of the fish were captured in one net making the confidence interval very high. PSD was 3 with 98% of the fish sampled being under stock length. Condition was very poor with a Wr of 64. Density of bullheads had increased over the past surveys.

Black crappie was the only game fish species sampled with significant numbers during the 2001 survey. A CPUE of 9 was recorded. This is a decrease from 26.9 recorded in 1998. The size structure was large with most crappies falling in the preferred size category. PSD was 88. Condition was good with a Wr of 95.5. The common carp population increased from 1998 to 2001. Carp CPUE was 14.9 with a PSD of 11. Condition was very poor with a Wr of 76.4. Other species captured include seven pumpkinseed sunfish, two channel catfish, one bluegill and one largemouth bass.

Total catch of eight, 24 hour, frame nets at Geddes Lake, Charles Mix County, June 11-13, 2001.

Spec.	#	%	CPUE (80%CI)	PSD (90%CI)	Stock Mean Wr (90%CI)
BLB	3586	94.7	448.3(381.2)	3(3)	63.8(0.4)
BLC	72	1.9	9.0(7.5)	88(7)	95.5(1.4)
BLG	1	0.0	0.1(0.2)	--	118.5(--)
CCF	2	0.0	0.3(0.2)	--	110.8(43.4)
CAP	119	3.1	14.9(6.8)	11(21)	76.4(4.6)
LMB	1	0.0	0.1(0.2)	--	----
PUS	7	0.2	0.9(0.8)	--	95.2(1.9)

Total 3788

Quality and Condition for Black Crappie on Geddes Lake, Charles Mix County, 2001.

Category	RSD(90%CI)	Wr(90CI)
Stock	--	110.6(0.7)
Quality	88(7)	102.0(---)
Preferred	86(7)	94.1(0.7)
Memorable	14(7)	88.8(0.7)

MANAGEMENT GOAL

To manage the fishery at Geddes Lake to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Decrease black bullhead densities to a trap-net CPUE of 50 or less.
Strategy 1a. Increase predator densities to a level that effectively limits bullhead recruitment.
Strategy 1b. Physically remove black bullheads to reduce densities.
- Objective 2.** Establish Geddes Lake's largemouth bass population at a nighttime electrofishing CPUE of 20 or greater
Strategy 2a. Electrofish to monitor current bass population.
Strategy 2b. Stock largemouth bass, if necessary, to establish a population.
- Objective 3.** Maintain the black crappie population with a CPUE of between 15 and 30 with condition and growth at or above the state average.
Strategy 3a. Monitor black crappie population by means of standard population survey methods to determine density, growth and condition.
- Objective 4.** Inform, receive, and use public input to assist in the management of Geddes Lake.
-

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2004 and 2007 utilizing eight, 24-hour frame-net sets and one hour of nighttime electrofishing to monitor all fish species.
2. Utilize Department crews to remove all black bullheads captured during the 2004 and 2007 surveys.
3. If electrofishing yields a CPUE of less than 20 bass per hour, stock largemouth bass adults at a rate of 10 per acre.
4. If netting survey reveals a black crappie CPUE of less than 5, stock with adults at a rate of 10/acre.
5. The local Conservation Officer and other GF&P staff should solicit input from all sources and provide information to the Regional Fisheries Manager on a timely basis.
6. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Lake Andes (17-1)

County: Charles Mix

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999- December 2003

Surface Area: 4,180

Management Class: WWM

Maximum Depth: 11 Feet

Mean Depth: 4 Feet

INVENTORY

Lake Andes is located in southeastern South Dakota near the town of Lake Andes and bordered by the Lake Andes National Wildlife Refuge. The Refuge is managed primarily for waterfowl production. The water source for the lake is mainly runoff from an 84,000-acre watershed. The main inflow is from Andes Creek, which terminates at the north end of the lake, with additional water entering the south unit via Owens Bay. The watershed consists of primarily agricultural cropland, interspersed with native grasslands. Rainfall averages 55 cm per year, while evaporation averages 96 cm per year. Depending on annual precipitation, Lake Andes fluctuates from practically dry to completely full. Since 1922, Lake Andes has been essentially dry on an average of once every eleven years. The fluctuating water levels are detrimental to most game fish species, but less harmful to undesirable species. Due to this fact, carp and bullhead dominate the fish population resulting in very turbid water conditions preventing the growth of submergent aquatic vegetation.

Historically, Lake Andes was a much larger body of water. In 1922 Congress authorized the construction of an outlet structure which when completed established a high water elevation of 1437.24 feet above sea level, effectively lowering the lake water level by 13 feet. Presently, at full pool, Lake Andes is approximately 4,180 surface acres, with an average depth of 3-4 feet. Two county roads divide the lake into three units. The North Unit is approximately 680 surface acres with a maximum depth of 10 feet, the Center Unit is about 1,900 surface acres with a maximum depth of 11 feet, and the South Unit consists of approximately 1,600 surface acres with a maximum depth of 11 feet.

Lake Andes has a long history of recreational fishing. The first recorded fish stocking took place in the early 1900's and a "renowned" largemouth bass fishery developed. Since that time, reduced lake levels, sedimentation, and eutrophication have all contributed to the decline of the fishery. The lake was last renovated in 1958 and

restocked in 1959. After ample rainfall in 1962, the lake provided a quality fishery until winterkill in 1964. Since that time several stockings have taken place but a satisfactory fishery has not developed other than during short periods when high water levels were sustained for several years.

Lake Andes can at best be considered a “boom and bust” fishery with short periods of good fishing during high water levels followed by declining fishing until a major fish kill occurs. Unfortunately, most fishermen only remember the “boom” years and would like the fishery maintained as such. During the winter of 2001 a major fish kill occurred greatly reducing the number of all fish species. Netting efforts the following spring revealed a remnant population of carp and bullhead that had either survived in the lake or entered via the watershed during the spring’s runoff. The lake was stocked with northern pike fry and prespawn yellow perch in 2001 to reintroduce game fish and hopefully establish a fishery.

STOCKING RECORD FOR LAKE ANDES, 1983 – PRESENT

Year	Species	Number	Size
1983	Bluegill	4000	Adult
1983	Largemouth Bass	34500	Fingerlings
1983	Northern Pike	750000	Fry
1984	Bluegill	218000	Fingerling
1984	Northern Pike	63	Adult
1984	Northern Pike	1000000	Fry
1984	Walleye	3500	Adult
1984	Yellow Perch	3500	Adult
1985	Black Crappie	50000	Fingerling
1985	Bluegill	400	Adult
1985	Bluegill	182000	Fingerling
1985	Northern Pike	1400000	Fry
1986	Northern Pike	1400	Adult
1987	Northern Pike	100000	Fingerling
1994	Northern Pike	60000	Fingerling
1995	Northern Pike	275	Adult
1995	Northern Pike	71400	Fingerling
1996	Yellow Perch	4820	Adult
1997	Northern Pike	100000	Fingerling
2001	Yellow Perch	800	Adult
2001	Northern Pike	2000000	Fry

Lake Andes' fish population was sampled on May 21 – 23, 2002 to determine the status of all fish species and to evaluate the success of northern pike and yellow perch stocking efforts. The lake investigation was requested by Refuge staff to provide information for future lake management decisions regarding the manipulation of water levels in favor of waterfowl production and vegetation growth. A total of six, ¾-inch mesh, 3X5-foot frame nets and two, 150-foot experimental gill nets were set in the south and center units of Lake Andes on May 21. The nets were ran and reset on May 22, and ran and pulled on May 23. A representative sample of each species captured was weighed and measured. All game fish were individually counted. Due to excessive numbers, rough fish (carp and bullhead) were sample counted and fish/gallon was used to determine total number. The vast majority of fish sampled were juvenile (one-year-old), so age and growth information was not collected or analyzed. Since juvenile fish are below stock length, stock density indices (PSD and RSD), and condition factors (Wr) were not calculated.

Black Bullhead

Black bullhead was the most abundantly sampled fish species in Lake Andes during the 2002 lake investigation. Frame net CPUE for bullhead in the South Unit was 578.8 while the Center Unit CPUE was a more manageable 51.1. Length frequencies for both units were similar with the majority of fish being under 150 mm.

Table 1. BLACK BULLHEAD CPUE – LAKE ANDES, MAY, 2002

Net #	1	2	3	4	5	6	Total	CPUE
South Unit								
Trap Net	82	24	975	874	506	1012	3473	578.8
Gill Net	0	0					0	0
Center Unit								
Trap Net	5	26	124	69	5	77	306	51.1
Gill Net	0	5					5	2.5

Common Carp

Common carp were the second most abundant species sampled at Lake Andes. Like bullhead, yearling fish dominated the population with all carp measured being less than 350 mm. Carp were most abundant in the South Unit with a frame net CPUE of 155.5 and a gill net CPUE of 35.5. The Center Unit's CPUEs were 5.5 and 29 respectively. The only adult carp observed were in the South Unit.

Table 2. COMMON CARP CPUE – LAKE ANDES, MAY, 2002

Net #	1	2	3	4	5	6	Total	CPUE
South Unit								
Trap Net	75	12	274	209	121	242	933	155.5
Gill Net	24	47					71	35.5
Center Unit								
Trap Net	4	4	13	7	5	0	33	5.5
Gill Net	34	24					58	29

Northern Pike

Following the winterkill of 2001, 2 million northern pike fry were stocked in Lake Andes to reestablish the species and provide a predator to help control rough fish. During the 2002 lake investigation, yearling northern pike were sampled indicating successful recruitment from the 2001 fry stocking. Northern pike ranged from 450 mm to 550 mm, growth was above the state average. One northern pike greater than one-year-old was also sampled.

Table 3. NORTHERN PIKE CPUE – LAKE ANDES, MAY, 2002

Net #	1	2	3	4	5	6	Total	CPUE
South Unit								
Trap Net	2	1	1	2	1	0	7	1.2
Gill Net	3	1					4	2
Center Unit								
Trap Net	5	3	4	3	2	2	19	3.17
Gill Net	1	8					9	4.5

Yellow Perch

Eight hundred pre-spawn yellow perch were also stocked into Lake Andes in April of 2001. Twenty-two perch were sampled during the May 2002 netting. Of the perch, two were adult and the remaining 20 were juvenile. The pre-spawn adults stocked in 2001 had successfully reproduced and created a year-class of fish that were between 130 mm and 190 mm at age one.

Table 3. YELLOW PERCH CPUE – LAKE ANDES, MAY, 2002

Net #	1	2	3	4	5	6	Total	CPUE
South Unit								
Trap Net	1	0	2	5	0	2	10	1.7
Gill Net	6	0					6	3
Center Unit								
Trap Net	0	1	0	0	0	2	3	0.5
Gill Net	3	0					3	1.5

Management of Lake Andes should be representative of a marginal fishery. Lake water levels are the limiting factor in fisheries management. During periods of high water, low oxygen tolerant game fish species, such as northern pike and yellow perch, can, and do, produce a short-term fishery. When water levels recede, Lake Andes is unable to support fish life. Historical records indicate that fluctuating water levels will not allow a long-term fishery to develop with current lake conditions. Except when the lake is at full-pool, and remains that way for an extended period of time, it is extremely difficult to manage as a fishery.

Due to their ability to withstand low water levels and depleted dissolved oxygen supplies, rough fish (carp and bullhead) will continue to dominate the fish community. Even after a severe fish kill, the unrestricted movement of fish from the watershed, through all three units of the lake, allows rough fish to quickly reestablish their population. Without the installation of a structural barrier to restrict rough fish movement from all or at least one section of the lake, it is nearly impossible to establish a predator population that can successfully limit recruitment.

MANAGEMENT GOAL

To manage the fishery at Lake Andes to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Maintain black bullhead and carp densities at a trap-net CPUE of 50 or less.
- Strategy 1a. Increase predator densities to a level that effectively limits rough fish recruitment.
- Strategy 1b. Physically remove carp and bullheads to reduce densities.
- Objective 2.** Establish Lake Andes's northern pike population with a CPUE of 5/net or greater
- Strategy 2a. Stock northern pike to introduce the species to the lake if necessary after winterkill when lake levels allow.
- Objective 3.** Enhance the yellow perch population to a CPUE of between 6 and 12 with condition and growth at or above the state average.
- Strategy 3a. Monitor yellow perch population by means of standard survey methods to determine density, growth and condition.
- Objective 4.** Inform, receive, and use public input to assist in the management of Lake Andes.
-

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey following fish kills to determine remaining fish population utilizing eight, 24-hour frame-net sets to monitor all fish species.
2. Utilize Department crews to remove all black bullheads and carp captured during the surveys.
3. If netting survey reveals a yellow perch CPUE of less than 5, stock with perch adults at a rate of 10/acre when lake level allows.
4. If standard survey reveals a northern pike CPUE of 2 or less, stock with fingerlings at a rate of 100/acre or fry at a rate of 1000/acre when lake level allows.
5. The local Conservation Officer and other GF&P staff should solicit input from all sources and provide information to the Regional Fisheries Manager on a timely basis.
6. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Gardner Lake

County: Harding

Present Plan: F-21-R-36

Date: Jan 1, 2004 to Dec 31, 2008

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 203 acres

Management Class: WWP

Maximum Depth: 8 feet

Mean Depth: 5 feet

Legal Description: Township 19N, Range 4E, Sections 10, 15, 22

MANAGEMENT GOAL

Optimize angling opportunities at Gardner Lake.

OBJECTIVES AND STRATEGIES

Objective 1. To maintain a walleye fishery with a minimum gill-net CPUE for stock-length walleye of 10, a PSD range of 30-60, RSD-P of 10 or greater, and a growth rate of 35.5 cm (14 in) at age-3.

Strategy 1a. Evaluate the walleye population by conducting lake surveys.

Strategy 1b. If anecdotal evidence suggests harvest is limiting the walleye population, then explore the use of a length limit.

Strategy 1c. Stock advanced walleye fingerlings into voids of natural production or when supplementing the population is needed.

Objective 2. To maintain a channel catfish fishery with a minimum gill-net CPUE for stock-length catfish of 10 and a PSD range of 30-60.

Strategy 2a. Evaluate the channel catfish population by conducting lake surveys.

Strategy 2b. If necessary, stock adult channel catfish to supplement the existing population.

Strategy 2c. If stockings do not maintain the catfish population near objective ranges then consider discontinuing stockings or implementing a habitat project to provide favorable structures for catfish.

Objective 3. To increase the black crappie trap-net CPUE between 10 and 50, and maintain PSD between 50 and 80.

Strategy 3a. Monitor the black crappie population by conducting standard population surveys to determine any changes in density, size structure, growth and condition.

Strategy 3b. Maintain predator densities (i.e. walleye, northern pike, channel catfish and largemouth bass) at levels that, in addition to harvest, will effectively maintain crappie numbers within objective ranges.

Objective 4. Keep the local conservation officer, other agencies and the

public informed of fisheries management activities and solicit their input when planning changes in management objectives.

Strategy 4a. Provide completed lake survey reports and management plans to other agencies and the public when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 2 to 4 years utilizing eight 24-hour frame net sets, a minimum of two 150' experimental gill net sets and six 10 minute night time electrofishing stations.
 2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
 3. If netting reveals walleye CPUE less than the stated objective values, stock advanced fingerlings at a rate of 1 to 2 lbs per surface acre (5 to 10 advanced fingerlings per surface acre) to supplement the population.
 4. If netting reveals channel catfish CPUE less than stated objective values then stock adult catfish at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the population.
 5. If anecdotal information indicates low angler satisfaction then re-evaluate angler attitudes towards the fishery and develop a management option that addresses angler wants.
 6. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2009.
-

INVENTORY

Gardner Lake is a 203 acre reservoir located 3 miles west and 1 mile north of Buffalo in Harding County. The reservoir was created in 1949 and is named after Bill Gardner, a state representative from Buffalo, who was instrumental in constructing the lake and acquiring land and access to the lake. The lake is fed by a small stream and runoff. Overflow runs into the South Fork of the Grand River, ultimately draining into the Oahe Reservoir.

The watershed is approximately 13,500 acres. About 90% of the watershed is pastureland containing a few stock dams or dugouts. The drainage area is mostly sandy clay with sparse vegetative covering made up mostly of short prairie grasses. In recent years the lake has been suffering from low water levels and heavy turbidity. Siltation occurs during heavy runoff in the inlet area where most of the rooted aquatic vegetation appears. Bulrush and cattail are the primary emergent plant species associated with the lake. Grassy pondweed is the more abundant submersed vegetative species in the lake. The boat ramp, picnic shelters and outhouse are located on the southwest side of the lake. There was extensive repairs of the dam and spillway in 1987 and 1988.

Ownership of Lake and Adjacent Lakeshore Properties:

Garner Lake is owned and managed by the Department of Game, Fish and Parks. Access to the lake is by a gravel road off of Highway 20. Two easements for access were obtained in 1947 and a third easement was obtained in 1966 for the road right of way.

Fishery Management:

Past management of Gardner Lake has been as a family fishery providing a variety of sportfish. Since construction of the dam fish stockings (Table 1) have been the primary management tool of fisheries in the lake. Early stockings included walleye, largemouth bass, northern pike, black bullheads and channel catfish. The primary game species for most of the life of the reservoir has been walleye and channel catfish. Pressure is assumed to be rather light compared to other west river reservoirs and there are no special regulations in effect for the fishery.

Characteristics of Fish Populations

Fish population surveys were conducted at Gardner Lake on June 23-25, 2003. Sampling consisted of two 100-foot experimental gill net nights and eight ¼-inch trap net nights. Ten species of fish were collected throughout the survey. Results from the survey are included in the following tables and text.

Table 1. Stocking record for Gardner Lake, Harding County, 1987-2003.

Year	Species	Number	Size
1987	Largemouth bass	20,300	Fingerlings
1989	Largemouth bass	20,000	Fingerlings
1991	Largemouth bass	20,000	Fingerlings
1996	Channel catfish	79	Adults
	Black crappie	280	Adults
	Channel catfish	72	Adults
1997	Black crappie	800	Adults
	Channel catfish	85	Adults
	Channel catfish	60	Adults
1998	Channel catfish	32	Adults
	Channel catfish	75	Adults
2003	Channel catfish	310	Adults

Table 2. Catch data for all fish species collected from eight, ¼ inch trap nets in Gardner Lake, Harding County, 2003. (CPUE, 80% CI's; CPUE-S, 80%CI's; PSD, RSD-P, 90% CI's; Wr-S, 80%CI's)

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black crappie	67	8.4 (1.6)	7.5 (1.1)	77 (10)	8 (6)	--
Channel catfish	1	0.1 (0.2)	0.0 (--)	--	--	--
Common carp	2	0.3 (0.2)	0.3 (0.2)	--	--	--
Largemouth bass	1	0.1 (0.2)	0.1 (0.2)	--	--	--
Northern pike	14	1.8 (0.6)	1.8 (0.6)	93 (13)	0 (--)	84.7 (5.3)
Walleye	16	2.0 (1.0)	1.8 (0.7)	79 (21)	29 (23)	85.3 (3.5)
White sucker	3	0.4 (0.3)	0.4 (0.3)	--	--	--
Yellow perch	2	0.3 (0.4)	0.0 (--)	--	--	--
Total	106					

Table 3. Catch data for all fish species collected from two 150-ft experimental sinking gill nets in Gardner Lake, Harding County, 2003.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr ≥ S
Black crappie	9	4.5 (4.6)	2.5 (1.5)	80 (43)	0	88.7 (7.5)
Channel catfish	4	2.0 (0)	2.0 (0)	--	--	94.1 (4.7)
Common carp	44	22.0 (0)	22.0 (0)	9 (7)	0	88.9 (0.8)
Northern pike	5	2.5 (1.5)	2.5 (1.5)	100 (--)	20 (43)	80.5 (6.5)
Shorthead redhorse	1	0.5 (1.5)	0.5 (1.5)	--	--	--
Spottail shiner	41	20.5 (32.3)	--	--	--	--
Walleye	10	5.0 (3.1)	5.0 (3.1)	100 (--)	10 (18)	84.9 (1.8)
White sucker	2	1.0 (0)	1.0 (0)	--	--	87.6 ((5.1)
Total	116					

Black crappie

Black crappie density appears to be decreasing. CPUE in 2003 was down substantially from previous years (Table 4). Stock density values and length frequencies (Figure 1) indicate a balanced population. In addition, mean growth rates are slightly faster the regional average (Table 5). Low water may be suppressing crappie recruitment and from the number of predator species it is unlikely the crappie population will become overabundant unless the predator populations become unbalanced.

Table 4. Composite listing of catch data for black crappie collected by frame nets in Gardner Lake, 1996-2003.

Year	N	CPUE	PSD	RSD-P
1996	253	31.2	95	45
1999	593	74.1	98 (1)	0 (--)
2003	67	8.4 (1.6)	77 (10)	8 (6)

Table 5. Gardner Lake black crappie length-at-age data for 2003 and the regional crappie mean length-at-age (Willis et al. 2001). (SE in parentheses)

Year Class	Age	N	Age				
			1	2	3	4	5
2001	2	3	63	108			
2000	3	2	56	102	142		
1999	4	9	72	128	170	212	
1998	5	7	79	128	172	212	228
Mean (SE)		21	68 (5)	117 (7)	161 (10)	212 (0)	228 (0)
Region 1 Mean			74 (3)	122 (7)	158 (9)	197 (13)	217 (16)

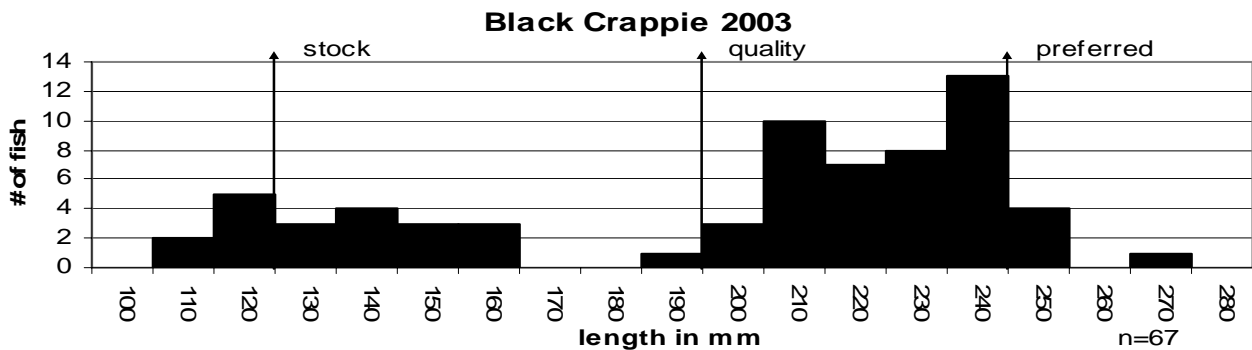


Figure 1. Length frequency histogram of black crappie collected by frame nets in Gardner Lake, June 23-25, 2003.

Channel catfish

Catfish catch during the survey was extremely low (Tables 2 and 3). Catfish have been stocked periodically but recruitment appears to be limited. If future stockings do not help increase catfish numbers, stockings should be discontinued or structures favorable to catfish included in the lake management.

Walleye

The last recorded stocking of walleye in Gardner was in 1982. In spite of this, the walleye population has continued to maintain itself at a low density. In addition, age and growth data and length frequencies identify several year classes (Table 6, Figure 2). Growth was excellent. Mean length-at-ages were faster than the regional mean and also faster than statewide mean until age-5. Biannual stockings of advanced fingerlings should help increase walleye density.

Table 4. Composite listing of catch data for walleye collected by gill nets in Gardner Lake, 1996-2003.

Year	N	CPUE	CPUE-S	PSD	RSD-P
1993	21	1.8		86	2
1994	34	5.7		66	3
1996	72	12.0		20	
1999	8	8.0		13 (13)	0 (--)
2003	10	5.0 (3.1)	5.0 (3.1)	100 (--)	10 (18)

Table 3. Gardner Lake walleye 2003 mean length-at-age data (± 1 SE), and the Region 1 and South Dakota walleye mean length-at-ages (Willis et al. 2001).

Year	Age							
Class	Age	N	1	2	3	4	5	6
2002	1	2	108					
2001	2	2	146	302				
2000	3	7	203	327	406			
1999	4	5	177	282	354	449		
1997	6	2	185	287	363	413	459	524
Mean(SE)		18	164 (17)	300 (10)	374 (16)	431 (18)	459 (0)	524 (0)
Region 1 Mean			164 (17)	260 (22)	332 (27)	385 (32)	444 (42)	
S.D. Mean			168 (3)	279 (6)	360 (7)	425 (8)	490 (9)	

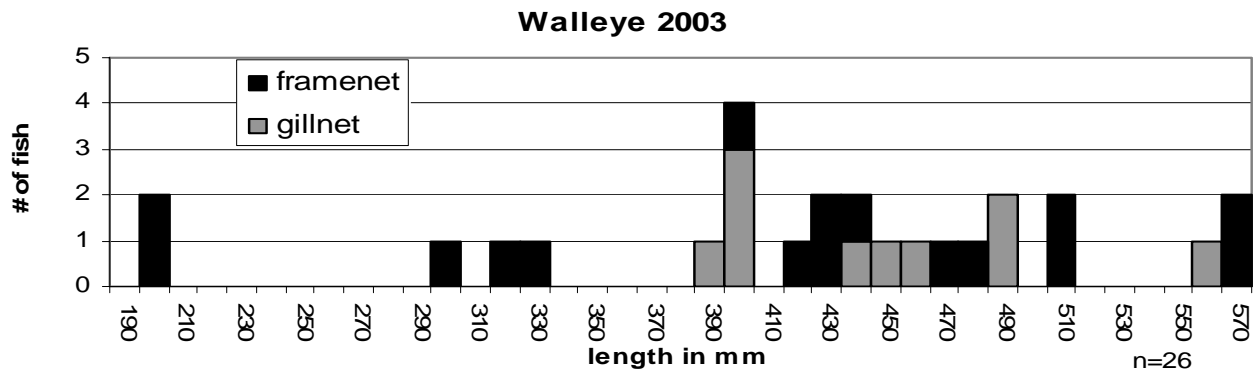


Figure 1. Length frequency histogram of walleye collected by gill nets and frame nets in Gardner Lake, June 23-25, 2003.

LITERATURE CITED

Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Platte Lake (17-6)

County: Charles Mix

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 60 Acres

Management Class: WWM

Maximum Depth: 8 Feet

Mean Depth: 5 Feet

Legal Description: Section 16, Township 99, Range 68

INVENTORY

Platte Lake is a 60-acre impoundment located 2.5 miles west of the City of Platte in northern Charles Mix County. The lake derives its name due to its proximity to the City of Platte. The artificial impoundment was created in 1931 when the Works Progress Administration (WPA) constructed an earthen dam on the lower portion of Platte Creek approximately 5 miles above the point where it enters the Missouri River. To allow for the construction of the dam grade and lake, two easements were granted to the State of South Dakota for public use of the lake and a strip of land 12 feet above the high water contour. These easements are recorded in the Charles Mix County Register of Deeds office, Misc. Book 13, pages 5, 6 and 7. The primary owner of Platte Lake is the City of Platte. Other than a recreational fishery, the primary use of Platte Lake is as a source of water for the adjacent golf course.

The watershed of Platte Lake is listed at approximately 35 square miles or 22,400 acres. Topography varies from gently rolling to steep upland slopes. Soils in the watershed are primarily loamy clays. The immediate shoreline is a golf course on the east side and wooded or brushy steep slopes on the west side of the lake. The remainder of the watershed consists of approximately 50% cultivated cropland and 50% pasture and hayland. Several small dams and dugouts are found on the watershed above Platte Lake. Heavy siltation has occurred throughout the entire lake and has significantly reduced Platte's total holding capacity. Emergent vegetation surrounds most of the shoreline and is especially dense on the northern third of the lake. Due to the poor water clarity there is very little submergent vegetation found at Platte Lake. From the outlet of the lake, water flows down Platte Creek to Lake Francis Case on the Missouri River. Access to the east side of Platte Lake is excellent from SD Hwy 44 through the golf course. The boat ramp is in poor condition, but because of the poor quality of the fishery, receives very little use.

Very little information is found in the lake files concerning the recreational aspects of Platte Lake prior to 1984. Records indicate that Platte was heavily stocked with fish from 1932 until 1953. Fish stockings took place on an annual basis during those years and included such species as black crappie, black bullhead, northern pike, walleye and largemouth bass. Northern pike were also stocked in the late 1960s, 1977 to 1983 and again in 1997. Though many stockings of northern pike have occurred in the past, the shallow lake probably reaches temperatures at or near the species' thermal limit during the summer months.

Stocking record for Platte Lake, Charles Mix County 1966 - 2004

YEAR	NUMBER	SPECIES	SIZE
1966	10,600	LMB	FGL
1966	100,000	NOP	FRY
1967	100,000	NOP	FRY
1968	50,000	NOP	FRY
1977	20,000	BLG	FGL
1978	71	NOP	ADT
1979	463	NOP	ADT
1979	175	YEP	ADT
1980	273	NOP	ADT
1982	1,300	YEP	ADT
1983	10,000	NOP	FGL
1988	75,000	NOP	FRY
1997	12,000	NOP	FRY

The first documented modern lake survey at Platte Lake took place in 1984. Black bullheads and common carp dominated the fish population. One northern pike, one yellow perch, and 18 sunfish were also sampled during the 1984 survey. Later surveys in 1988 and 1993 showed much the same information with the vast majority of the fish captured being bullheads and carp. During lake surveys conducted in 1996 and again in 1999, bullheads continued to dominate the fish population, however black crappie, northern pike and largemouth bass numbers had improved providing the best fish population documented at Platte Lake in recent history.

Platte Lake was most recently sampled during October of 2002 with six overnight trap net sets. The lake was also nighttime electrofished for 40 minutes in 2002. No experimental gill nets were set at Platte Lake. The lake was approximately 3 feet below full elevation at the time of the survey.

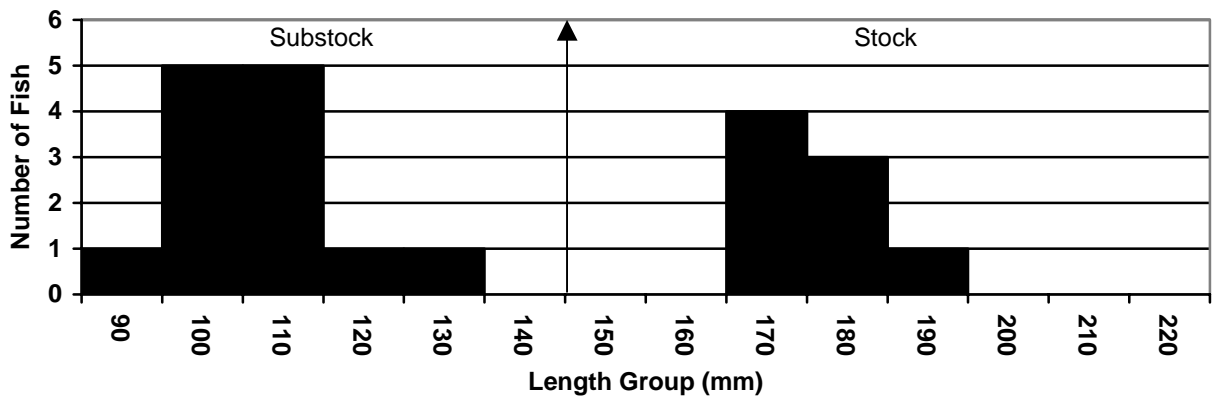
Small black bullheads and common carp dominated the fish population at Platte Lake during the 2002 survey. The CPUE's of both species dramatically increased from the five year means of 316 and 10.5 respectively to 4905.5 and 3488.5. The PSD for carp was 58 and the PSD for bullheads was 0. The only other fish sampled were 3 sunfish. During the electrofishing only bullheads and carp were observed.

Total catch of six, overnight ¾-inch frame nets at Platte Lake, Charles Mix County, October 8-9, 2002.

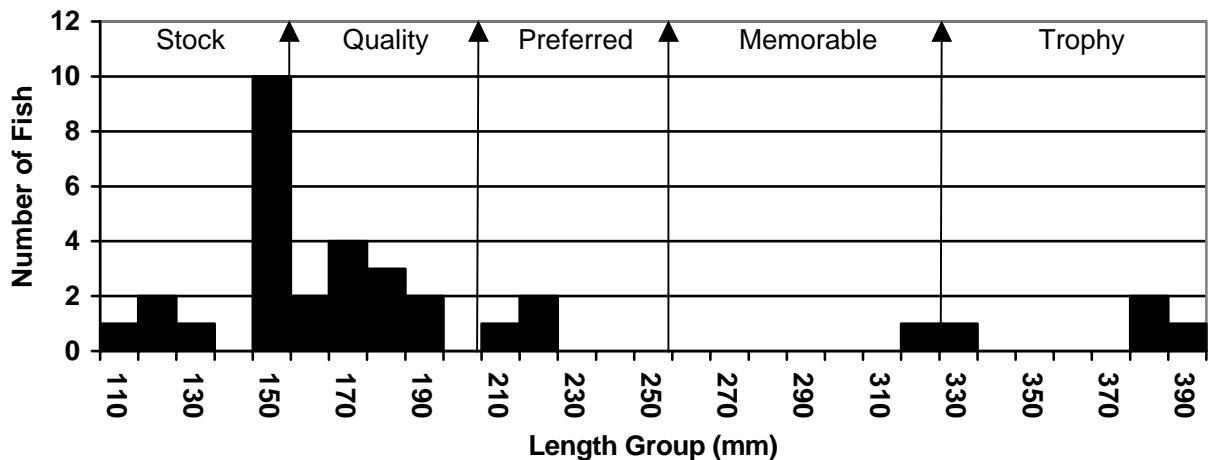
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	29,433	58.4	4905.5	± 1429.9	316.0	0	0	0
Common Carp	20,931	41.6	3488.5	± 1013.9	10.5	58	24	0
Orangespotted Sunfish	2	0.004	0.3	± 0.2	0.5	0	0	0
Green Sunfish	1	0.002	0.2	± 0.5	0.9	0	0	0

* Five years (1984, 1988, 1993, 1996, and 1999)

Length frequency histogram for black bullhead sampled from Platte Lake, Charles Mix County, 2002.



Length frequency histogram for common carp sampled from Platte Lake, Charles Mix County, 2002.



MANAGEMENT GOAL

To manage the fishery at Platte Lake to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Reduce black bullhead and common carp densities to a combined trap net CPUE of 50 or less.

Strategy 1a. Increase predator densities to a level that effectively limits bullhead and carp recruitment.

Strategy 1b. Physically remove black bullheads and common carp to reduce densities.

Objective 2. Establish Platte Lake's largemouth bass population with a nighttime electrofishing CPUE of 20 or greater

Strategy 2a. Stock largemouth bass adults to reintroduce the species if necessary after low water fish kills.

Objective 3. Reestablish the black crappie population to a CPUE of between 10 and 20 with condition and growth at or above the state average.

Strategy 3a. Monitor black crappie population by means of standard survey methods to determine density, growth and condition.

Objective 4. Maintain northern pike densities with a CPUE of 5/net or greater to provide an additional predator to control bullheads.

Strategy 4a. Monitor northern pike population by use of standard survey methods to determine density, growth and condition.

Strategy 4b. Stock with northern pike fingerlings, if necessary, to supplement population.

Objective 5. Inform, receive, and use public input to assist in the management of Platte Lake.

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey following fish kills utilizing eight, 24-hour frame-net sets and one hour of nighttime electrofishing to monitor all fish species.
2. Utilize Department crews to remove all black bullheads and common carp captured during the lake surveys.
3. If netting survey reveals a black crappie CPUE of less than 5, stock with adults at a rate of 10/acre.
4. If standard survey reveals a northern pike CPUE of 2 or less, stock with fingerlings at a rate of 100/acre.
5. The local Conservation Officer and other GF&P staff should solicit input from all sources and provide information to the Regional Fisheries Manager on a timely basis.
6. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.

Completed by Dan R Jost, Regional Fisheries Manager, Region II

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Rosehill Lake (33-3)

County: Hand

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 35 Acres

Management Class: WWP

Maximum Depth: 31 Feet

Mean Depth: 13 Feet

Legal Description: Section 21, Township 110, Range 66

INVENTORY

Rosehill Lake is a 35-acre impoundment 12 miles south and one mile east of Vayland in south central Hand County. Rosehill derives its name from Rosehill Township in which the lake is located. The artificial impoundment was created with construction of an earthen dam on the upper end of Sand Creek by the Works Progress Administration (WPA) in 1938. To allow for the original construction of the dam and creation of the impoundment two easements for the lake and a twelve-foot strip of land above the high water contour were signed in 1937. These easements are recorded with the Hand County Register of Deeds, Misc. Book 27, pages 6 and 38. The original dam washed out in 1955 and the State of South Dakota enter into several easements to reconstruct the dam and provide public access to the lake and a strip of land 100 feet wide above the high water contour. These easements are recorded in Misc. Book 35, pages 236, 237, 238 and 239 in the Hand County courthouse. In addition to the easements for public use, the South Dakota Game Fish & Parks Dept. owns 19 acres on the northeast side of the lake.

The watershed of Rosehill Lake covers approximately 16,000 acres or 25 square miles. Topography in the watershed varies from nearly level to moderately undulating. Soil types are deep loamy, clay loams and clay pan. The immediate shoreline, excluding the dam grade and access area is 100% native grasses which is utilized as pastureland. The remainder of the watershed is approximately 70% native grasses utilized as pasture and hayland, 25% cultivated agricultural land, and 5% roads, shelterbelts and farm yards. Records indicate there are at least twenty-five dams or dugouts and forty-three slough areas in the watershed. Siltation has not been identified as a major degrading factor at Rosehill Lake, however livestock feeding areas located on the watershed directly above the lake have resulted in some moderate to heavy amounts of nutrients entering the lake through normal runoff. Emergent and submergent vegetation is found sparsely scattered around the perimeter of the lake with the heaviest amount located in the extreme upper end. From the outlet of Rosehill Lake water flows easterly down Sand Creek to the James River. Access to Rosehill is good with a gravel county road leading to the access area and concrete boat ramp.

Rosehill has been utilized as a recreation area and supported a fishery since its construction in 1938. Development of access and recreational facilities did not take place until 1957 when the South Dakota Dept. of Game, Fish & Parks purchased 19 acres of land on the northeast side of the lake. A cooperative agreement was signed with Rosehill Township for construction and maintenance of access facilities at the lake. Currently the Parks Division of GF&P completes maintenance duties of the lake access area. Though not recorded in the stocking record for Rosehill, the initial stockings of black bullheads and black crappies occurred in the late 1930s. These two species, especially crappies, supported the fishery until the early 1950s. Fishing pressure and success declined in the 1950s due to the overpopulation of bullhead, carp and green sunfish. The lake was chemically eradicated in 1962 and restocked with rainbow trout that provided a good fishery for two years until bluegills, walleyes and northern pike grew to a size acceptable to anglers and supported the fishery. Bluegill and walleye remained the primary gamefish in Rosehill until the early 1990s when management objectives turned toward largemouth bass and black crappie. A major fish kill took place during the winter of 2001. A lake assessment the following spring showed only a small population of black bullheads remained in the lake. The lake was restocked with adult and fingerling largemouth bass and adult crappie.

Stocking record for Rosehill Lake, Hand County 1980 - 2003

YEAR	NUMBER	SPECIES	SIZE
1980	4,000	LMB	FGL
1980	37,000	WAE	FRY
1981	3,000	LMB	FGL
1981	11,000	RBT	FGL
1982	1,250	LMB	FGL
1983	800	LMB	FGL
1984	2,000	WAE	FGL
1986	2,850	YEP	FGL
1988	2,850	WAE	FGL
1989	2,850	WAE	FGL
1990	6,000	LMB	FGL
1990	4,000	YEP	FGL
1991	13,800	WAE	FGL
1992	2,000	YEP	FGL
1993	2,000	LMB	FGL
1995	234	BLC	ADT
1999	151	LMB	ADT
1999	3,500	LMB	FGL
1999	405	LMB	ADT
2000	166	LMB	ADT
2001	3,400	LMB	FGL
2001	150	LMB	ADT
2001	197	BLC	ADT
2003	7,840	LMB	FGL

The most recent fish population survey was conducted at Rosehill Lake during the summer of 2002. Ten, overnight frame net sets in June and five, ten-minute periods of electrofishing in October were used to sample the fish population. No experimental gill nets were set in Rosehill in 2002.

Black bullhead remained the dominant species during the 2002 survey. This is not surprising after the assessment in 2001 revealed that bullheads were the only species in Rosehill Lake following the winterkill. Bullhead frame net CPUE was 330.1 and PSD was 78. The black crappie stocking of 197 adults in 2001 was very successful. A CPUE of 40.6 was recorded in 2002, which is near densities prior to the winterkill. A PSD of 36 was recorded but many of these fish were from the 2001 yearclass and below stock length. Crappie growth was slow, but this was somewhat misleading since the adult fish had been stocked in Rosehill only one year prior to the survey.

Other species sampled in the June netting were northern pike and a fairly large population of yellow perch. These fish were not stocked by GF&P following the 2001 winterkill and had entered the lake during periods of high runoff or were stocked by private individuals. Only 12 largemouth bass were sampled during the October electrofishing. The lack of largemouth bass in the survey was disappointing given that 3,400 fingerlings and 150 adults were stocked the previous year.

Total catch of ten, overnight ¾-inch frame nets at Rosehill Dam, Hand County, June 24-26, 2002.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean W _r
Black Bullhead	3301	85.7	330.1	± 114.1	0	78	0	89
Black Crappie	406	10.5	40.6	± 22.3	0	36	0	107
Yellow Perch	118	3.1	11.8	± 5.8	0	43	2	98
Northern Pike	23	0.6	2.3	± 1.3	0	0	0	87
Largemouth Bass	4	0.1	0.4	± 0.4	0	--	--	104

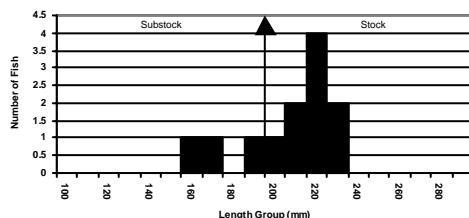
* Winterkill during the winter of 2000/2001

Total catch from five, ten-minute runs of fall nighttime electrofishing on Rosehill Dam, Hand County, October 15, 2002.

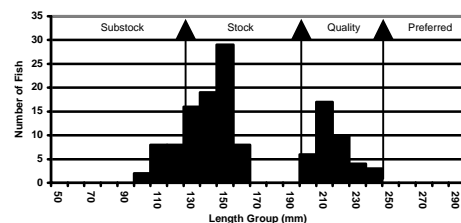
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean W _r
Largemouth Bass	12	100	14.4	±15.6	0	0	0	102

* Winterkill during the winter of 2000/2001

Largemouth Bass, 2002



Black Crappie, 2002



MANAGEMENT GOAL

To manage the fishery at Rosehill Lake to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Increase largemouth bass population to a nighttime electrofishing CPUE of 50/hour and a PSD of 40 or greater.
- Strategy 1a. Monitor largemouth bass population by means of standard survey methods to determine density, age, growth, size structure, and condition.
- Strategy 1b. Stock largemouth bass adults to supplement existing population.
- Objective 3.** Decrease black bullhead densities to a CPUE of 25 or less.
- Strategy 3a. Maintain largemouth bass and northern pike populations at a level that effectively limits bullhead recruitment.
- Objective 4.** Maintain yellow perch CPUE at 10/gillnet with growth and condition at or above the state average.
- Strategy 4a. Monitor yellow perch population utilizing standard survey methods.
- Strategy 4b. Stock yellow perch adults, if necessary, to supplement existing population.
- Objective 5.** Maintain black crappie population at current densities with growth and condition at or above the state average.
- Strategy 5a. Monitor black crappie population to determine growth and size structure and to monitor recruitment of young fish into the adult population.
- Objective 6.** Inform, receive, and use continuing input from the public and other agencies to assist in the management of Rosehill Lake.
-

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys in 2004 and 2007 utilizing eight, 24 hour , ¾ inch frame net sets, two, 150 foot, experimental gill net sets, and at least one hour of nighttime electrofishing to monitor all fish species.
2. Stock largemouth bass adults at a rate of 10/acre in 2004.
3. If black crappie have a CPUE of less than 20 per overnight frame net set in 2004, stock with adult crappie at a rate of 10/surface acre in 2005 and 2006.
4. If yellow perch CPUE is less than 10 per gill net catch, stock with adults at a rate of 10/acre to supplement population.
5. Remove all black bullheads captured during the 2004 and 2007 surveys.
6. The local Conservation Officer and other GF&P staff should solicit input from all public sources and provide information to the Regional Fisheries manager on a regular basis.
7. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Mission Lake

County: Hyde

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 55 Acres

Management Class: WSP

Maximum Depth: 17 Feet

Mean Depth: 6 Feet

Legal Description: Section 18, Township 109 North, Range 71 West

INVENTORY

Mission Lake is a 55-acre impoundment located one-mile east and one half-mile south of Mac's Corner in southwestern Hyde County. The lake derived its name from the Stephan Mission School that owned the land on which the lake was constructed. Mission Lake is also referred to as Boehm Lake after Pius Boehm, the priest at the Stephan Mission School who signed the easement allowing construction of the dam creating the lake. The artificial impoundment was created in 1939 when the Works Progress Administration (WPA) constructed an earthen dam on a tributary to the west fork of Elm Creek. Two allow for the construction of the dam and the flooding of the land which would create the lake, three public use easements were granted to the State of South Dakota for the lake and a strip of land 12 feet above the high water contour. These easements are recorded in Miscellaneous Book 12, pages 324-326 at the Hyde County Register of Deeds Office, Hyde County Courthouse, Highmore, SD.

The watershed for Mission Lake is relatively small at 9,600 acres or approximately 15 square miles. Topography varies from near level to moderately rolling. Soils are primarily clay and gumbo covered with short native grasses. The immediate shoreline is 100% native grass that is grazed annually. Gravel mining activities take place in the watershed directly adjacent to the upper end of the lake. Land use in the remainder of the watershed is approximately 85% pasture or hayland, 10% cultivated agricultural land, and 5% shelterbelts and farmyards. There are several small dams and dugouts in the watershed of Mission Lake. Slight to moderate siltation is apparent in the upper ¼ of the lake. A very limited amount of submergent vegetation is found in Mission Lake with sparse amounts of emergent vegetation, mainly bulrush, found in the upper end and along the west shoreline. From the outlet of Mission Lake water flows south down Elm Creek through Hyde County and enters Lake Sharpe on the Missouri River near the Brule County border. A gravel trail from a paved county road provides good access to the west

edge of Mission Lake. A concrete boat ramp in fair condition provides water access and the lack of vegetation allows for ample shore fishing opportunity. There are no docks, toilets, or other user facilities at Mission Lake.

Mission Lake has provided a good fishery to area residents since shortly after its construction in 1939. Though not on record, information in the lake file indicates that largemouth bass were stocked in 1939 and 1940. References are made to bass being the species most caught by anglers in the 1940s. During the 1950s bass and walleye made up the fishery and the 1960s saw white crappie, bullhead and northern pike as the primary species. Very little lake management information is available for Mission Lake prior to 1962 due to the fact that it was commonly thought the lake was on tribal land of the Crow Creek Indian Reservation. In fact, the lake lies just outside of the reservation boundary. The first recorded lake survey took place in 1962 with white crappie, black bullhead, carp, yellow perch, white sucker, northern pike, and largemouth bass present. Since 1962 several stockings of northern pike, walleye, largemouth bass, perch and crappie have been completed at Mission Lake. From the 1970s to present, crappie, northern pike, and channel catfish have supported the fishery.

Stocking record for Mission Lake, Hyde County

YEAR	NUMBER	SPECIES	SIZE
1964	200,000	NOP	FRY
1966	300	WAE	ADT
1977	29,000	WAE	FRY
1980	60,000	NOP	FRY
1982	1,500	NOP	FGL
1987	2,900	NOP	Fgl
1988	6,000	NOP	FGL
1989	2,000	LMB	FGL
1989	1,200	LMB	FGL
1989	2,500	NOP	FGL
1990	6,000	YEP	FGL
1991	460	BLC	ADT
1991	2,900	NOP	FGL
1995	51	NOP	ADT
1995	5,500	NOP	FGL

The most recent fish population survey was conducted at Mission Lake during the summer of 2003. Ten, overnight frame net sets on June 9-11 were used to sample the adult fish population. No experimental gill nets or electrofishing was completed at the time of the 2003 survey.

Black bullheads and white suckers were the two dominant species sampled during the 2003 survey, 49.7% and 39.1% of the fish population respectively. Other species sampled were channel catfish (7.8%), green sunfish (2.6%), and common carp (0.8%). There were many species not sampled in this survey that have been previously sampled such as northern pike, largemouth bass, and white crappie.

**Total catch of 10, overnight ¾-inch frame nets at Mission Lake, Hyde County,
June 9-11, 2003**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	192	49.7	19.2	± 6.1	59.7	93	8	85
White Sucker	151	39.1	15.1	± 4.0	3.0	99	65	98
Channel Catfish	30	7.8	3.0	± 2.1	3.5	77	0	87
Green Sunfish	10	2.6	1.0	± 0.7	2.0	40	0	118
Common Carp	3	0.8	0.3	± 0.2	0.3	--	--	95

* Twelve year mean (1968, 1973, 1976, 1981, 1983, 1986, 1988, 1990, 1992, 1994, 1997, and 2000)

The black bullhead population density has declined dramatically during the past 5 years. The 2003 CPUE was 19.2, which is down from the all time recorded high of 322.8 in 2000, 181.4 in 1997, and a twelve-year mean of 59.7. PSD was 93 and RSD-P was 8 in 2003. Channel catfish, which are the only prominent predator currently in Mission Lake, maintain a steady, but cyclic population. Mission Lake is one of the few small impoundments in Region II in which catfish have a self-sustaining population. The white sucker population is at an all time high with a 2003 CPUE of 15.1. The twelve-year mean CPUE for suckers is 3.5. Green Sunfish and common carp were the only other species captured in 2003.

CPUE for all fish species sampled in Mission Lake since 1968.

Species	1968	1973	1976	1981	1983	1986	1988	1990	1992	1994	1997	2000	2003
Black Bullhead (TN)	49.0	0.1	2.0	0.5	45.8	77.3	5.9	3.1	21.7	7.4	181.4	322.8	19.2
Black Crappie (TN)	--	--	--	--	--	--	--	--	13.2	0.1	13.6	--	--
White Crappie (TN)	--	56.1	0.5	3.4	3.3	45.1	62.5	1.4	--	9.6	--	2.3	--
Yellow Perch (GN)	--	--	4.0	--	--	--	--	2.0	--	--	--	--	--
Yellow Perch (TN)	--	0.4	0.3	--	0.8	4.9	1.0	--	0.7	0.4	--	--	--
Largemouth Bass (TN)	0.4	--	--	--	2.8	--	--	--	--	0.1	0.1	--	--
Northern Pike (TN)	--	0.8	0.4	0.4	0.3	0.1	--	0.1	0.5	1.0	0.5	0.6	--
Channel Catfish (TN)	--	--	3.8	1.3	0.5	13.1	0.3	--	1.6	1.6	17.5	2.1	3.0
Whiter Sucker (TN)	19.0	0.5	0.1	0.6	1.8	0.3	0.1	--	7.0	2.6	1.8	2.4	15.1
Common Carp (TN)	--	0.1	1.3	0.4	0.5	0.4	0.1	--	0.3	0.8	0.1	0.0	0.3
Bluegill (TN)	--	0.1	--	--	--	--	--	--	--	--	3.1	2.4	--
Green Sunfish (TN)	24.0	--	--	--	--	--	--	--	--	--	0.3	--	1.0

MANAGEMENT GOAL

To manage the fishery at Mission Lake to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Increase densities of predator species in Mission Lake to limit rough fish densities and recruitment.
- Strategy 1a. Maintain channel catfish at a frame net CPUE of 3 or greater.
 - Strategy 1b. Introduce walleyes by stocking fingerlings to provide another predator species to Mission Lake.
 - Strategy 1c. Increase northern pike densities to a trap net CPUE of 3 or greater.
 - Strategy 1d. Monitor all predator fish species by means of standard survey methods to determine density, age, growth, size structure, and condition.
- Objective 2.** Increase white crappie densities to a trap net CPUE of 10 or greater with growth and condition at or above the state average.
- Strategy 2a. Stock white crappie adults to increase brood population and promote increased recruitment.
 - Strategy 2b. Monitor white crappie population by means of standard survey methods to determine density, age, growth, size structure, and condition.
- Objective 3.** Decrease rough fish densities by limiting recruitment of black bullhead, white sucker, and common carp.
- Strategy 3a. Maintain black bullhead at a trap net CPUE of 20 or less.
 - Strategy 3b. Decrease white sucker to a trap net CPUE of 10 or less.
 - Strategy 3c. Maintain common carp trap net CPUE of 5 or less.
 - Strategy 3d. Monitor all rough fish species by means of standard survey methods to determine density, age, growth, size structure, and condition.
-

5 YEAR OPERATIONAL PLAN

1. Stock walleye fingerlings at a rate of 100 / acre in 2004 and 2006 to introduce the species and provide a predator to control rough fish densities and recruitment.
2. Stock white crappie adults at a rate of 10 / acre in 2005 to increase the population of brood fish and provide a panfish species for angling opportunity.
3. Conduct a standard fisheries population survey in 2006 utilizing eight, 24 hour, $\frac{3}{4}$ inch frame net sets and two, 150-foot experimental gill net sets to monitor all fish species.
4. The local Conservation Officer and other GF&P staff should solicit input from private and public sources and provide information to the Regional Fisheries Manager on a timely basis.
5. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.

Completed By Dan R. Jost, Regional Fisheries Manager, Region II

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Larson Dam (45-5)

County: Lyman

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-30

Date: January 1997 – December 2001

Surface Area: 8 Acres

Management Class: WWP

Maximum Depth: 16 Feet

Mean Depth: 6.1 Feet

Legal Description: Section 9, Township 104, Range 73

INVENTORY

Larson Dam is an 8-acre impoundment four miles southeast of Reliance in eastern Lyman County. The lake was named after A. J. Larson, the owner of the land at the time of construction. The artificial impoundment was created in 1934 when the Works Progress Administration (WPA) constructed an earthen dam on the upper end of Big Creek. To allow for the construction of the dam and the flooding that would create the lake, A. J. Larson signed an easement contract with the State of South Dakota dedicating to the public the lake and a strip of land 12 feet above the high water contour. This easement is recorded in the Lyman County Register of Deeds office, Misc. Book 10, Page 387. Ownership of Larson Dam is 100% private.

The watershed of Larson Dam is small at approximately 1,280 acres or 2 square miles. Topography varies from nearly level to moderately sloping. Soils are primarily loams and clays. Land use in the watershed is 60% cultivated cropland, 35% native grasses utilized as hay or pastureland, and 5% roads, tree belts and farm yards. The immediate shoreline is native grassland. Moderate siltation is apparent throughout the lake. Emergent vegetation, primarily cattail is found around the majority of the perimeter of Larson Dam with submergents found throughout the lake growing to a depth of four feet. From the spillway of Larson Dam water flows down Big Creek to American Crow Creek and Lake Francis Case on the Missouri River. Access to the lake is gained via a dirt trail from a county road and South Dakota Highway 47. There are no boat ramps or other public use facilities located at Larson Dam.

Very little information is documented regarding the history of Larson Dam. The first recorded fisheries management activity took place in 1972 when 1,000 largemouth bass fingerlings were stocked. A scheduled lake survey during the summer of 1976 was not completed due to low water levels. Largemouth bass fingerlings were again stocked in 1978 followed by introductions of channel catfish and northern pike in 1981 and 1983. The first lake survey of record was completed at Larson Dam in 1988. This survey was conducted using eight frame nets. Yellow perch, black bullhead, largemouth bass, and walleye were sampled. Surveys in 1991 and 1995 had much the same results with bullheads dominating the fish population and yellow perch being the most abundant gamefish sampled.

Stocking record for Larson Dam, Lyman County

YEAR	NUMBER	SPECIES	SIZE
1972	1,000	LMB	FGL
1978	1,000	LMB	FGL
1981	350	CCF	FGL
1983	1,000	NOP	FGL

The most recent fish population survey at Larson Dam was conducted in June of 2000 utilizing eight overnight frame nets. No gill nets or electrofishing was completed during the 2000 survey. As in the past, black bullheads dominated the fish population in 2000. 3,3580 bullheads were captured for a CPUE of 510.8. PSD was 29 and condition was poor with a Wr of 84.1. Despite the high-density of black bullheads, yellow perch have maintained a fairly stable population over the past 10 years. CPUE for perch was 9.4 and PSD was 37 during the 2000 survey. Condition for perch was poor with a Wr of 83. Green sunfish was the only other species captured.

Total catch of eight, 24 hour, 3/4-inch frame nets at Larson Dam, Lyman County, June 26-28, 2000.

Spec	No.	Low 80% CI	Mean CPUE	Up 80% CI	Low 90% CI	PSD	Up 90% CI	Low 90% CI	Stock Mean Wr	Up 90% CI
BLB	3,350	204.2	357.5	510.8	13	29	45	81.5	84.1	86.8
GSF	86	5.1	10.8	16.4	0	4	9	92.5	93.2	93.9
YEP	75	5.8	9.4	13.0	26	37	48	82.3	83.0	83.7

MANAGEMENT GOAL

To manage the fishery at Larson Dam to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Reduce the density of black bullheads to a frame-net CPUE of 50 or less.

Strategy 1a. Increase the density of largemouth bass limiting bullhead recruitment.

Strategy 1b. Remove black bullheads to reduce the population density.

Objective 2. Increase the density of largemouth bass to an electrofishing CPUE of 35 or greater.

Strategy 2a. Monitor largemouth bass population utilizing electrofishing equipment to determine current population size structure, density, and growth.

Strategy 2b. Stock largemouth bass adults a rate of 10/acre to increase density and limit bullhead recruitment.

Objective 3. Monitor yellow perch to determine population structure, condition and growth.

Objective 4. Inform, receive, and use public input to assist in the management of Larson Dam.

5 YEAR OPERATIONAL PLAN

1. Stock largemouth bass adults at a rate of 10/acre to increase density, support natural recruitment and limit black bullhead numbers.

2. Conduct a standard fish population survey in 2006 using eight, ¾ inch frame-net sets and at least one half hour of nighttime electrofishing to monitor all fish species.

3. Utilize Department crews to remove all bullheads captured at the time of the 2006 survey.

4. The local Conservation Officer and other GF&P staff should solicit input from all sources and provide information to the Regional Fisheries Manager on a timely basis.

5. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.

Completed by Dan R Jost, Regional Fisheries Manager, Region II

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Hayes Lake

County: Stanley

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 64 Acres

Management Class: WWP

Maximum Depth: 15 Feet

Mean Depth: 6 Feet

Legal Description: Sections 29-30, Township 5 north, Range 26 west

INVENTORY

Hayes Lake is a 64-acre impoundment located one half-mile east of the town of Hayes in west central Stanley County. The Lake derived its name from the City of Hayes and has no other known names. The construction of the rolled earth dam and concrete spillway was completed in 1937 by the Works Progress Administration (WPA). The dam and impoundment are located on Frozen Man's Creek, a tributary of Plum Creek. No easements for the lake or for public access could be found at the Register of Deeds office in the Stanley County courthouse in Fort Pierre, SD. On January 6, 1953, Stanley County, for the sum of one dollar, gave a quick claim deed to the State of South Dakota for approximately 80 acres on Tract A in Section 29, Township 5, Range 26. This deed is recorded in volume 183, page 262 in the Stanley County Register of Deeds office. Stanley County reserved all mineral, gas and oil rights. Currently, Hayes Lake is primarily located within the 80-acre Game Production Area owned and managed by the South Dakota Dept. of Game, Fish and Parks.

The watershed of Hayes Lake is made up of 23,680 acres or approximately 37 square miles. The watershed is located primarily north of the lake with soils of the Opal-Promise Association which are of clay and shale type. Topography varies from nearly level to moderately rolling upland slopes. The immediate shoreline of Hayes Lake is native grasses within the Game Production Area. The remainder of the watershed is composed of 50% native grasses utilized as hay and pastureland, 45% cultivated agricultural land, and 5% farmyards, tree belts, and the town of Hayes. There are records of 42 dams and six dugouts within the watershed of Hayes Lake. Moderate siltation has occurred throughout the lake and is heaviest in the upper 1/3. Siltation has led to increased vegetation growth and decreased total water volume. Emergent vegetation, consisting mainly of cattail, surround 95% of the lake's shoreline. Submergents are found throughout the lake to a depth of 5 feet during the summer months. From the outlet of Hayes Lake, water flows southward down Frozen Man's Creek to Plum Creek

and the Bad River before entering the Missouri River near Fort Pierre. Access to Hayes Lake is good with a gravel road from SD Hwy. 34 to the boat ramp and access area on the east side of the lake. Aquatic vegetation limits shore fishing opportunity, however most fishing pressure at Hayes Lake occurs through the ice during the winter months.

Hayes Lake has provided a recreational fishery since shortly after its construction in 1938. The first recorded stockings of black bullhead and largemouth bass were completed in the late 1930s and these two species composed the principle angling opportunities for the following 30 years. Hayes Lake has had a reputation as an excellent largemouth bass fishery. The first fish population survey on record was completed in 1968 with green sunfish, black bullheads, largemouth bass and northern pike being present. Throughout the 1970s Hayes Lake continued to provide a good fishery for largemouth bass and bullhead. Though there is no record of stocking, bluegills were first observed in Hayes Lake in 1985 and have provided a quality panfish opportunity ever since. During 1997-1999 Hayes Lake was part of a study to determine the effective use of walleye and saugeye in small impoundments. The fish were stocked during those years but proved unsuccessful and the program was dropped.

Stocking records for Hayes Lake, Stanley County

Year	Number	Species	Size
1936	2,500	Black Bullhead	Adults
1936	4,000	Black Bullhead	Fingerling
1936	1,500	Largemouth Bass	Fingerling
1982	8,500	Largemouth Bass	Fingerling
1983	377	Channel Catfish	Adult
1986	2,500	Largemouth Bass	Fingerling
1997	1,600	Walleye	Fingerling
1997	1,600	Saugeye	Fingerling
1998	1,600	Walleye	Fingerling
1998	846	Saugeye	Fingerling
1999	1,600	Walleye	Fingerling
1999	560	Saugeye	Fingerling

The most recent fish population survey was completed at Hayes Lake during the summer of 2003. Ten, overnight, ¾-inch frame nets on June 2-4 and six, ten-minute runs of nighttime electrofishing on October 6. No experimental gill nets were set in Hayes Lake in 2003.

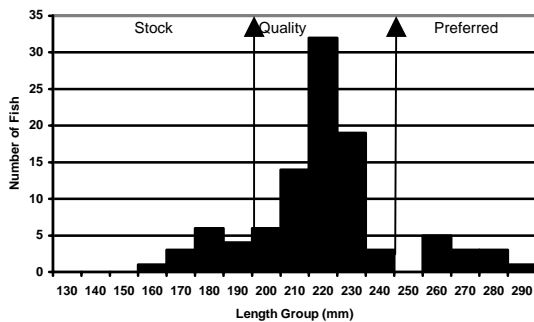
Black Crappie and Bluegill were the most abundant species captured in the frame nets during the 2003 survey with a CPUE of 18.2 and 11.5 respectively. Black crappies were first recorded in Hayes Lake in 1997 with a CPUE of 1.5 and again in 2000 with a CPUE of 8.3. Growth and condition of crappie is good with a PSD of 86 and Wr of 90 in 2003. With the increase in black crappie densities, the bluegill population has started to decline. In 2003 the CPUE was 11.9 compared to the 21.7 nine-year mean. Condition was good in 2003 with a Wr of 95. PSD was 85 and RSD-P was 39 indicating good size structure in the bluegill population. Other species captured in the frame nets include black bullhead, walleye, northern pike, and yellow perch.

**Total catch of ten, overnight ¾-inch frame nets at Hayes Lake, Stanley County,
June 2-4, 2003**

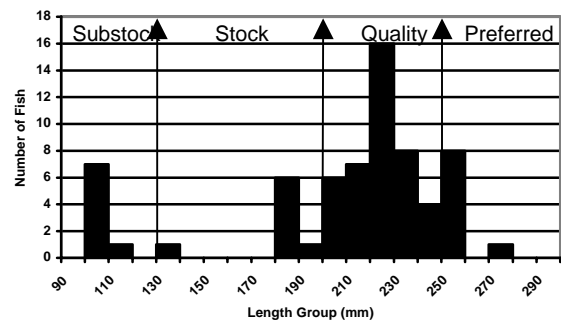
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	182	44.8	18.2	± 8.4	1.1	86	12	90
Bluegill	115	28.3	11.5	± 3.3	21.7	85	39	95
Black Bullhead	94	23.1	9.4	± 2.0	100.7	100	98	104
Walleye	7	1.7	0.7	± 0.3	0.0	100	29	94
Northern Pike	5	1.2	0.5	± 0.3	2.0	20	--	82
Yellow Perch	3	0.7	0.3	± 0.4	2.2	67	33	88

* Nine year mean (1971, 1975, 1978, 1984, 1987, 1991, 1994, 1997, 2000)

Length Frequency histogram for black crappie sampled from Hayes Lake, Stanley County, 2003



Length frequency histogram for bluegill sampled from Hayes Lake, Stanley County, 2003



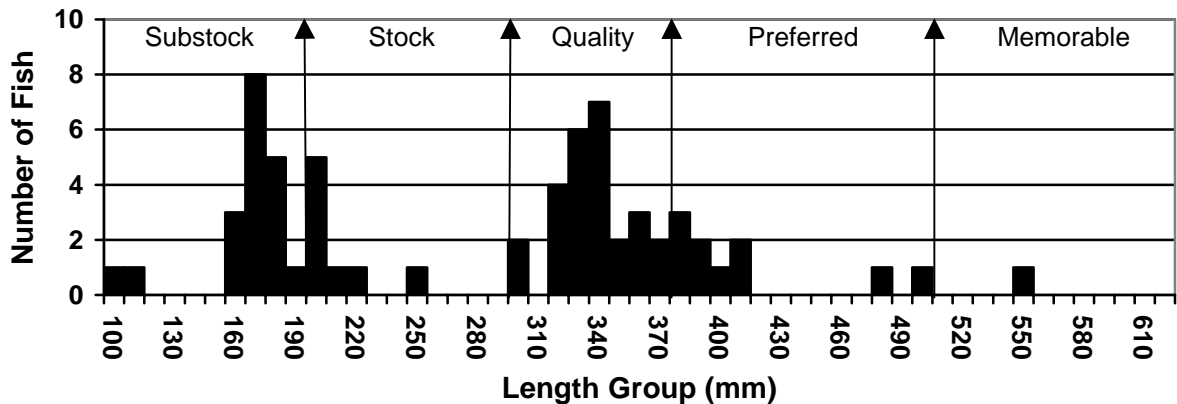
Largemouth bass remain the predominant predator species in Hayes Lake. The 2003 survey yielded a CPUE of 64 bass per hour of electrofishing. This is down from the CPUE of 117 in 2000 but above the 38.5 six-year mean. PSD was 82 and RSD-P was 24, which are both an increase from the 2000 survey. Condition was excellent with a W_r of 101. As seen during past surveys, the growth of largemouth bass in Hayes Lake is slower than the State average but size distribution is excellent indicating consistent recruitment.

**Total catch from six ten-minute runs of fall nighttime electrofishing on Hayes Lake,
Stanley County, October 6, 2003.**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean W_r
Largemouth Bass	64	100	64	± 17.5	38.5	82	24	101

* Six year mean (1984, 1987, 1991, 1994, 1997, 2000)

**Length frequency histogram for largemouth bass sampled from Hayes Lake,
Stanley County, 2003**



MANAGEMENT GOAL

To manage the fishery at Hayes Lake to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Maintain largemouth bass population densities with nighttime electrofishing CPUE of 50\hour and a PSD of 40 or greater.
- Strategy 1a. Monitor largemouth bass population by means of standard survey methods to determine density, age, growth, size structure, and condition.
- Objective 2.** Maintain panfish PSD values between 40 and 60 with growth and condition factors at or above the state average.
- Strategy 2a. Maintain largemouth bass population at a density high enough to limit panfish recruitment and prevent overpopulation and slow growth rates.
- Objective 3.** Maintain black bullhead densities with a CPUE of 10 or less.
- Strategy 3a. Monitor black bullhead population using standard fish population survey methods.
- Objective 4.** Inform, receive, and use continuing input from the public and other agencies to assist in the management of Hayes Lake.
-

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2006 and 2009 utilizing ten, 24 hour, ¾ inch frame net sets and at least one hour of nighttime electrofishing to monitor all fish species.
 2. The local Conservation Officer and other GF&P staff should solicit input from private and public sources and provide information to the Regional Fisheries Manager on a timely basis.
 3. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.
-

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Cottonwood Lake

County: Sully

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-31

Date: January 1999 – December 2003

Surface Area: 454 Acres

Management Class: WSP

Maximum Depth: 18 Feet

Mean Depth: 9 Feet

Legal Description: Sections 19, 20, 29 & 30, Township 119N, Range 75W

INVENTORY

Cottonwood Lake is one of the few natural bodies of water that provide a fishery in northcentral South Dakota. The 454-acre lake is located eight and one half miles east of the town of Agar in northeastern Sully County. The lake provided angling and other forms of recreation from its origin until the mid-1930s when it became completely dry due to extended drought conditions. In 1938 the Works Progress Administration (WPA) initiated and completed a ditch to divert water from Okobojo Creek into Cottonwood Lake. The additional run-off waters nearly filled the lake in 1939. The ditch supplied water to Cottonwood Lake until 1952 when severe flooding inundated an adjoining landowner's property and the diversion gates were destroyed with dynamite. Though the gates were never repaired, Cottonwood Lake maintained good water levels until 1975 when extreme drought conditions once again caused the lake to be completely dry. Since 1978, Cottonwood Lake has maintained waters levels adequate to support an ongoing fishery.

The Cottonwood Lake watershed consists of approximately 47,000 acres or seventy-three and one half square miles and is located primarily north and east of the lake. Okobojo Creek comprises sixty percent of the watershed and the remaining forty percent is composed of small unnamed tributaries. Topography varies from nearly level to moderately sloping. Soil types are loams and silt loams with a substrate of sand, gravel or shattered rocks. The immediate shoreline at Cottonwood Lake is native grasses, a road grade, a narrow row of trees with cultivated agricultural land, and marsh areas. The remainder of the watershed is composed of approximately 60% cultivated cropland, 38%

native grasses utilized as pasture and hayland, 2% tree belts and wintering areas for cattle. The State of South Dakota, Dept. of Game Fish and Parks owns 160 acres on the northwest corner of the lake that is managed as a Game Production Area. Slight to moderate siltation has occurred at Cottonwood Lake and is most apparent in the marshy areas on the west and northeast sides of the lake. These areas are also where the only emergent and submergent vegetation can be found. From the outlet of Cottonwood Lake water flows northeast via an unnamed creek to Okobojo Creek which flows westerly to Lake Oahe on the Missouri River. A good gravel road from a county road leads to an access area on the west edge of the lake where a boat ramp and vault toilet is located. Another access area on the north edge of the lake provides shore fishing opportunity.

The first recorded fisheries management activities at Cottonwood took place in the late 1930s when bullhead and black crappie adults were stocked once the lake had regained water after being completely dry. During the 1940s and 50s walleyes, yellow perch and channel catfish were stocked on several occasions. Records indicate that walleyes and black bullheads made up the majority of the fishery at Cottonwood Lake during these early years. The first fish population survey at Cottonwood Lake was conducted in 1959. Black bullheads were the most abundant species making up 92.5% of the fish sampled. Yellow perch, black crappie, bluegill, channel catfish, walleye, and white sucker were the other species present. In a second survey in 1962 bullhead densities remained high, but perch and crappie numbers had increased dramatically. In 1963 crappies had replaced bullheads as the most abundant species in the lake and Cottonwood had a very healthy walleye population. By the time of the 1970 lake survey, black bullheads had once again regained their place as the dominant species in Cottonwood Lake, but walleyes and perch also had very good numbers and size structure. Walleye stockings continued into the 1970s and the stocked fish provided a good fishery until 1975 when water levels became too low to support fish life. Cottonwood Lake was completely dry during the summer of 1976. During the spring of 1977 run off provide water to the lake but levels were far from full pool. A fish population survey that summer revealed black bullhead, walleye, yellow perch, and white sucker had enter the lake from the watershed and made up the existing fish community.

Following the 1977 fish population survey results, extensive stockings of bluegill, channel catfish, largemouth bass, northern pike, walleye, and yellow perch were completed the following year. During the early 1980s Cottonwood sustained excellent populations of walleye and perch and they provided a very good fishery. In 1988 black crappies took over as the most abundant species. Walleyes, crappies and perch provided good fishing opportunity until 1993 when an unrecorded fish kill effected all of the gamefish species in Cottonwood Lake. Walleye, northern pike, and black crappies were restocked and by 1995 the fishery had recovered with walleyes and crappies providing the majority of the angling opportunity at Cottonwood Lake. The fishery has remained relatively stable from 1995 to present with stockings of walleye, black crappie, and yellow perch supplementing the population.

Stocking record for Cottonwood Lake, Sully County, 1988 to Present

YEAR	NUMBER	SPECIES	SIZE
1988	23,000	SMB	FGL
1989	25,000	WAE	FGL
1990	45,601	YEP	FGL
1991	50,000	WAE	FGL
1991	50,000	YEP	FGL
1992	26,700	LMB	FGL
1992	50,000	WAE	FGL
1992	10,000	YEP	FGL
1993	6,600	WAE	FGL
1993	5,000	WAE	FGL
1994	80	NOP	FGL
1994	46,000	WAE	FGL
1995	707	BLC	ADT
1995	916	BLC	ADT
1995	585	BLC	ADT
1995	84	NOP	ADT
1995	49	NOP	ADT
1995	46,000	NOP	FGL
1996	88,000	WAE	FGL
1999	50,600	WAE	FGL
2003	1,346	BLC	ADT
2003	964	YEP	ADT

The most recent fish population survey was completed at Cottonwood Lake during the summer of 2003. Twelve, overnight, ¾-inch frame net sets, and four, 150-foot, experimental gill net sets were used to sample the fish population during June 16-18 and six, ten-minute runs of nighttime electrofishing was completed on September 29.

**Total catch of four, 150 ft. experimental gill nets at Cottonwood Lake,
Sully County, June 16-18, 2003**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Walleye	10	32.3	2.5	± 1.6	9.6	100	50	82
Northern Pike	8	25.8	2.0	± 1.2	0.8	100	63	80
Common Carp	8	25.8	2.0	± 1.2	4.0	88	63	99
Yellow Perch	4	12.9	1.0	± 0.9	13.3	--	--	96
Bluegill	1	3.2	0.3	± 0.4	0.0	--	--	87

* Thirteen year mean (1983, 1984, 1991-2001)

**Total catch of twelve, overnight ¾-inch frame nets at Cottonwood Lake, Sully
County, June 16-18, 2003**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	68	66.0	5.7	± 3.4	40.8	99	93	92
Common Carp	11	10.7	0.9	± 0.3	7.4	73	45	86
Black Bullhead	3	2.9	0.3	± 0.2	94.7	100	0	95
Bluegill	5	4.9	0.4	± 0.4	1.1	40	0	110
Channel Catfish	3	2.9	0.3	± 0.3	0.03	100	0	100
Northern Pike	6	5.8	0.5	± 0.3	0.6	100	33	72
Walleye	7	6.8	0.6	± 0.5	4.0	86	71	80

* Fourteen year mean (1983, 1984, 1987, 1991-2001)

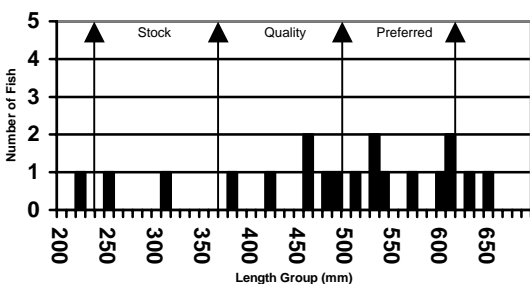
**Total catch from six ten-minute runs of fall nighttime electrofishing on
Cottonwood Lake, Sully County, September 29, 2003**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	25	86.2	25	± 35.2	12.1	--	--	113
Walleye	4	13.8	4	± 5.9	66.9	--	--	90

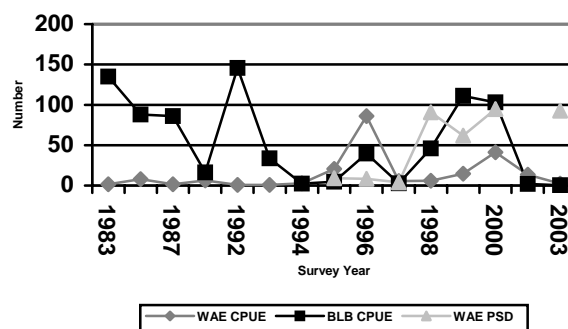
* Six year mean (1996-2001)

The walleye population in Cottonwood Lake has been slowly declining since 2000, although the overall structure looks to be in good shape. Growth is above the state average and relative condition is fair with Wr values of 80 for gill net catches and 82 for frame net catches of walleye. Size structure is good, with several age groups represented. It appears that walleyes have a difficult time sustaining their population in Cottonwood Lake without supplemental stocking. With walleye being the primary predator, it is necessary to maintain good densities to control the black bullhead population.

**Length frequency histogram for
Walleye sampled in Cottonwood
Lake, Sully County, 2003**

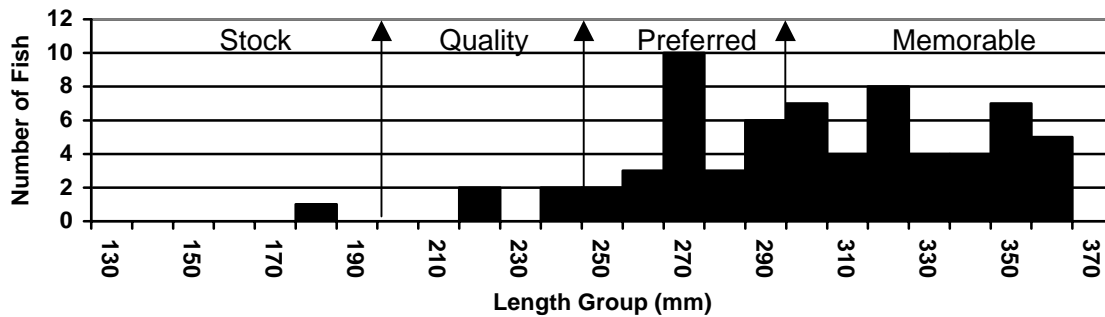


**Walleye and Black Bullhead CPUE
and Walleye PSD from Cottonwood,
Sully County**



The black crappie population in Cottonwood Lake is primarily made up of larger fish, indicating that reproduction has been limited the past three years. Growth and condition were good for crappies, at or above the state average. Adults were stocked in 2003 to supplement the existing population. The yellow perch population has been basically non-existent over the past 5 years. Adult perch were also stocked in 2003. Black bullheads remain at very low densities. It is important to maintain the walleye population in Cottonwood Lake to control the bullheads by limiting recruitment. Several substock largemouth bass were observed during electrofishing in 2003. Hopefully these fish will recruit into the adult population and provide a secondary predator.

**Length frequency histogram for Black Crappie sampled
from Cottonwood Lake, Sully County, 2003**



MANAGEMENT GOAL

To manage the fishery at Cottonwood Lake to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Maintain walleye population with a 150-foot, experimental gill net CPUE of 5 or greater and a PSD of 40 to 60.
- Strategy 1a. Monitor walleye population by means of standard survey methods to determine density, age, growth, size structure, and condition.
- Strategy 1b. Stock walleye fingerlings to maintain population levels adequate to limit rough fish recruitment and to provide moderate angling opportunity.
- Objective 2.** Utilize largemouth bass as a secondary predator to limit panfish and rough fish recruitment and increase angling opportunity.
- Strategy 2a. Stock largemouth bass fingerlings to maintain population levels adequate to limit black bullhead recruitment and to provide moderate angling opportunity.
- Strategy 2b. Monitor largemouth bass population to determine density and stocking success.
- Objective 3.** Maintain black bullhead densities to a CPUE of 10 or less.
- Strategy 3a. Maintain largemouth bass and walleye populations at a level that effectively limits bullhead recruitment.
- Objective 4.** Maintain black crappie CPUE at 5 or greater per trap net with growth and condition at or above the state average.
- Strategy 4a. Stock black crappie adults to supplement the existing population.
- Strategy 4b. Monitor black crappie population utilizing standard survey methods.
- Objective 5.** Increase yellow perch population to a gill net CPUE of 5 or higher with growth and condition at or above the state average.
- Strategy 5a. Stock yellow perch adults to supplement the existing population.
- Strategy 5b. Monitor yellow perch populations utilizing standard adult survey methods to determine density, growth and condition.
- Objective 6.** Inform, receive, and use continuing input from the public and other agencies to assist in the management of Cottonwood Lake.
-

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys in 2004 and 2007 utilizing twelve, 24 hour , ¾ inch frame net sets, four, 150 foot, experimental gillnet sets, and at least one hour of nighttime electrofishing to monitor all fish species.
2. Stock walleye fingerlings at a rate of 100/acre in 2004.
3. Stock black crappie and yellow perch adults in 2005 if survey results indicate densities of less than 5 per net.
3. The local Conservation Officer and other GF&P staff should solicit input from all public sources and provide information to the Regional Fisheries Manager on a regular basis.
4. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Fuller Dam

County: Sully

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-30

Date: January 1998 – December 2002

Surface Area: 40 Acres

Management Class: WSP

Maximum Depth: 17 Feet

Mean Depth: 7.7 Feet

Legal Description: Section 1, Township 115, Range 80

INVENTORY

Fuller Dam is a 40-acre impoundment sixteen miles west and six miles north of Onida in northwestern Sully County. Fuller Dam was named after J C Fuller, the owner of the land on which the dam was constructed. The artificial impoundment was created in 1938 when the Works Progress Administration (WPA) constructed an earthen dam on the upper end of an unnamed creek that flowed to the Missouri River. To allow for the construction of the dam and flooding that would create the lake, an easement for public use was granted to the State of South Dakota for the lake and a strip of land 100 feet wide extending from a nearby section line to the dam. This strip of land was to be designated by the Sully County Highway Superintendent. These easements are recorded in Miscellaneous Book 11, page 300 in the Sully County Register of Deeds office in Onida, SD.

The watershed of Fuller Dam covers 10,800 acres or approximately 17 square miles. Topography in the watershed is nearly level to gently undulating. Soils are mainly deep loams of the Agar-Onida Association. The immediate shoreline is native grasses however irrigated cropland is adjacent to approximately 40% of the lake. The remainder of Fuller Dam's watershed is approximately 80% cultivated cropland and 20% grassland utilized as pasture and hayland. Moderate to heavy siltation is evident throughout the lake decreasing total water volume and supplying nutrients that promote increased aquatic vegetation growth. Emergent vegetation, consisting mainly of bulrush, is found along 75% of the shoreline and is heaviest in the upper 1/3 of the lake. Submergent vegetation is found throughout the lake and grows to a depth of 7 feet. From the outlet of Fuller Dam water flows westerly down an unnamed creek one and one-half miles to Lake Oahe on the Missouri River. Water rights have been granted to private landowners to pump water for irrigation from Fuller Dam. In turn water is pumped from Lake Oahe to Fuller to maintain water levels. Historically access to Fuller Dam was gained from the south of the lake via a dirt trail leading from a township road. A change in ownership in 2002 resulted in the new owners denying access to the lake by the dirt trail. A review of

the records could not locate an official dedication of the 100-foot strip of land mentioned in the easement for public use. At this time the public has no legal access to Fuller Dam, even though the lake is considered public water.

Fuller Dam has provided a recreational fishery since the time of its construction. The first recorded fisheries management activities took place in 1938 and 1939 when bluegill and black bullheads were stocked into the lake. Information sighted from local individuals in the lake file indicated that Fuller Dam supported a good bass and panfish fishery during its early years. The first recorded fish stocking was completed in 1956 with channel catfish fingerlings being put in the lake. During the 1970s aquatic vegetation increased and records indicate several partial and total winterkills reducing the quality of the fishery from fair to poor. The first recorded fish population survey was conducted on Fuller Dam in 1972 with only black bullheads being observed. Largemouth bass, channel catfish and bluegills were stocked into the lake during the 1970s but the fishery never developed as hoped. The fishery continued to be poor throughout the 1980s with limited icefishing activity taking place for crappie and yellow perch. From 1989 to 1993 several stockings of fingerling largemouth bass were completed in an attempt to increase the population and provide a quality bass / panfish opportunity at Fuller Dam.

Stocking record for Fuller Dam, Sully County

YEAR	NUMBER	SPECIES	SIZE
1938	2,500	BLG	FGL
1939	2,000	BLB	ADT
1956	1,500	CCF	FGL
1961	BLG	400	ADT
1968	400	LMB	FGL
1968	25	LMB	ADT
1976	7,000	BLG	FGL
1976	5,850	LMB	FGL
1977	4,000	CCF	FGL
1977	6,000	LMB	FGL
1979	50,000	WAE	FRY
1989	200	BLC	ADT
1989	2,000	LMB	FGL
1990	2,000	LMB	FGL
1992	2,000	LMB	FGL
1993	2,000	LMB	FGL

The most recent fish population survey took place at Fuller Dam during July, 1996. Eight, overnight frame nets were utilized to sample the adult fish population. No experimental gill net sets or electrofishing was completed during this survey.

Black bullheads were the most abundant species sampled during the 1996 survey. Bullheads recorded a trap net CPUE of 307.88. None of the bullheads measured were of quality length. Yellow Perch numbers had increased since previous surveys with a CPUE of 18.13. Perch had a Wr of 81 and a PSD of 15. Twenty largemouth bass were captured in the trap nets, all of which were under 230 mm. This would indicate bass are naturally reproducing since no stocking had taken place since 1993.

**Total catch of eight, 24 hour, 3/4-inch frame nets at
Fuller Dam, Sully County, 1996**

Species	No.	%	Mean CPUE	80% CI	Last 2 Survey Mean CPUE	PSD	80 % CI	Stock Mean Wr
BLB	2463	92.6	307.9	107.48	52.6	0	--	--
YEP	145	5.5	18.1	6.25	1.0	15	5	81
GSF	30	1.1	3.8	2.53	4.1	90	--	89
LMB	22	0.8	2.8	2.13	0.1	--	--	96

MANAGEMENT GOAL

To manage the fishery at Fuller Dam to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Reestablish a legal means for the public to access Fuller Dam for the purpose of recreational angling on a permanent basis.

Strategy 1a. Continue to work with current landowner and Sully County officials to establish an access agreement or easement for the public angling use of Fuller Dam.

5 YEAR OPERATIONAL PLAN

1. Until a public access easement or agreement can be reached between the State of South Dakota, Game, Fish and Parks and the current owners of the land surrounding Fuller Dam, no further management activity should take place.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Lake Hiddenwood

County: Walworth

Present Plan: F-21-R-36

Date: January 2004 – December 2008

Previous Plan: F-21-R-30

Date: January 1998 – December 2002

Surface Area: 28 Acres

Management Class: WSP

Maximum Depth: 17 Feet

Mean Depth: 8 Feet

Legal Description: Section 23, Township 124, Range 76

INVENTORY

Lake Hiddenwood is a 28-acre impoundment located three miles north and 2.5 miles east of Selby in northeastern Walworth County. The lake is named after Hiddenwood Creek on which it was developed and has no other names. Hiddenwood Lake was created in 1926 under the direction of the Walworth County Highway Department with the construction of one of the first earthen dams in South Dakota. Shortly after construction was completed, heavy rainfall filled the lake. During the summer of 1926 the Selby Commercial Club enlisted the aid of the Governor of South Dakota, the Secretary of Agriculture, and the Game, Fish and Parks Commission. It was agreed that the Department of Game, Fish and Parks would buy the already flooded land, reimburse the County for construction of the dam grade, and manage the fishery in the newly created body of water. A group of citizens agreed to purchase the land adjacent to the lake and dedicate it for public use. On December 18, 1926 The Hiddenwood Lake Association purchased the NE1/4 of Section 23, Township 124, Range 76 as it is recorded in Misc. Book 34, page 382 of the Walworth County Register of Deeds Office. The Hiddenwood Lake Association sold 42 acres of this land to the South Dakota Dept. of Game, Fish and Parks in 1927 and the remainder of the 160 acres in 1947. These transactions are recorded in Misc. Book 34 and 47, pages 434 and 194 respectively.

In 1958 an easement was granted to the Game, Fish and Parks by Arne and Ragnee Odde on the NW1/4 of Section 24, Township 124, Range 76 which granted the right to locate, develop and maintain a park (Misc. Book 16, page 104). This easement was released for the consideration of grant title to 6.96 acres in the same section (Document # 76-48). Another 160 acres of land was obtained by the Dept. in 1972 when Robert and Olga Himrich gave the Game, Fish and Parks, at a cost of one dollar, the NW1/4 of Section 23, Township 124, Range 76 as recorded in Deeds Book 64, page 381. Today Lake Hiddenwood lies within 320 acres of South Dakota Department of Game, Fish and Parks property that is owned and managed by the Parks and Recreation Division.

Lake Hiddenwood has a watershed of 20,340 acres or approximately 31.7 square miles. The watershed is located primarily to the east with a small portion south of the lake. Soils in the watershed are primarily loams with gently sloping to moderately rolling topography. The immediate shoreline of Lake Hiddenwood is wooded land on steep slopes within the State Recreation Area. The remainder of the watershed is nearly 80% cultivated cropland, 18% native grasses utilized as pasture or hayland, and 2% roads, residences and farmyards. Records indicate that there are eleven small dams and eight dugouts in the Lake Hiddenwood watershed.

Traditionally siltation has been the major degrading factor to the water quality and the fishery at Lake Hiddenwood since the late 1950s. Currently siltation is at a minimum as a result of a successful dredging project completed in 1996. Emergent vegetation, consisting mainly of cattail, is found scattered along the shoreline and is most abundant in the upper ¼ of the lake. Submergent vegetation is sparse throughout the lake. From the outlet of Lake Hiddenwood water flows north in Hiddenwood Creek to Spring Creek, through Lake Pocasse and eventually to Lake Oahe on the Missouri River. Access to Lake Hiddenwood is excellent with the Parks Division of GF&P maintaining the recreation area, boat dock and ramp, swimming beach, hiking trails, and camping facilities.

Lake Hiddenwood has provided a recreational fishery since the time of its construction in 1926. The first recorded fish management practices where the stocking of black bullheads in 1929 and 1930 although indications are that bluegills and largemouth bass were stocked prior to the bullheads. From 1930 to the mid-1950s reports indicated that Hiddenwood provide a good bass and panfish fishery. Several stockings of largemouth bass and bluegill supported this fishery during the late 1940s and early 1950s. The first documented fish population survey was conducted in 1959 and indicated crappie, white sucker, bluegill and bullheads making up the majority of the fish population. A fish kill was recorded during the winter of 1960 and northern pike and bluegills were stocked in 1961 and 1962. During a 1963 lake survey, northern pike and black crappie had reestablished good populations, but by 1965 black bullheads and white suckers dominated the fish community. The following ten years showed poor fish populations and angling success due to increased siltation and frequent partial winterkills.

A dredging project took place during 1975 and 1976 to remove the unwanted silt that had accumulated on the lake bed and resulted in Hiddenwood being a marginal fishery. Bluegill, largemouth bass, northern pike, and channel catfish were stocked following the dredging project. The dredging was only marginally successful in deepening and increasing the water volume of Lake Hiddenwood and in 1981 the lake again suffered a major fish loss due to winterkill. Several stockings of bass, panfish and northern pike were completed from 1982 to 1995, but the fishery remained fair to poor during these years.

The Lake Hiddenwood Sportsman's Club organized and spearheaded another dredging project that took place during 1995 and 1996. During this project the lake's depth was successfully increased by an average of 3 feet across the basin. Following the dredging project, largemouth bass were stocked in 1997 and 1998 and bullhead and sucker removal was completed from 1997 to 1999. Since the time of the 1996 dredging, Lake Hiddenwood has not experienced fish loss due to winterkill. A 15-inch minimum creel limit was placed on largemouth bass at Lake Hiddenwood in 1999.

Stocking record for Lake Hiddenwood, Walworth County 1982 - Present

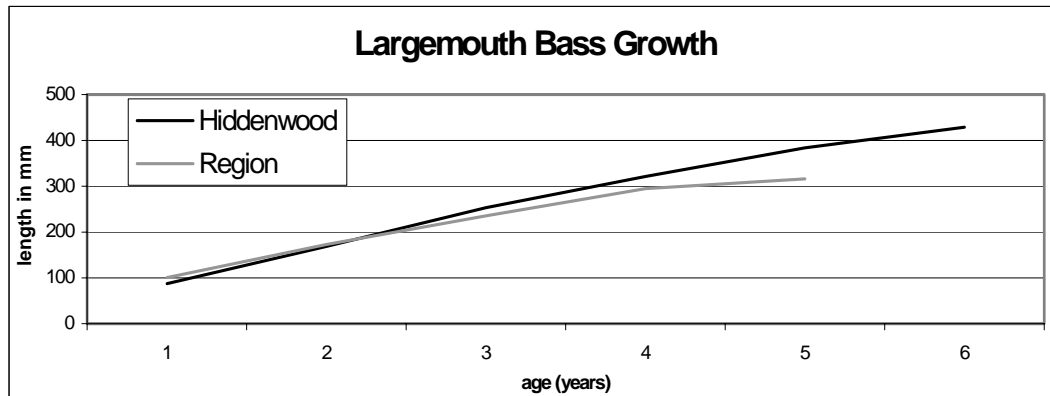
YEAR	NUMBER	SPECIES	SIZE
1982	750	LMB	FGL
1982	15,000	NOP	FRY
1982	300	YEP	ADT
1983	4,400	CCF	FGL
1986	200	BLC	ADT
1986	34	BLG	ADT
1986	64	LMB	ADT
1986	36	LMB	FGL
1986	15,000	NOP	FRY
1986	1,500	YEP	FGL
1987	200	BLC	ADT
1987	1,500	LMB	FGL
1988	1,500	LMB	FGL
1988	900	YEP	ADT
1989	100	LMB	ADT
1989	15,000	NOP	FRY
1997	134	LMB	ADT
1997	61	LMB	ADT
1997	2,800	LMB	FGL
1997	14,100	NOP	FRY
1998	50	LMB	ADT
1998	2,800	LMB	JUN
1998	310	LMB	JUN

The most recent fish population survey was conducted at Lake Hiddenwood during the summer of 2001. Ten, overnight frame net sets in June and four, ten-minute periods of electrofishing during October were used to sample the adult fish population. Experimental gill net sets were not utilized during the 2001 survey.

Lake Hiddenwood has a thriving largemouth bass population since the intensive stocking efforts in the late 1990s. During the 2001 survey the CPUE for largemouth bass was 201.0 fish per hour of nighttime electrofishing. PSD was 59 and RSD-P was 4. Wr was above 110 for all age classes with fish over stock length having a Wr of 112. Even with a 15-inch minimum size limit, largemouth bass growth remains above the state average. Utilizing Hiddenwood as a source of bass to stock in other waters may reduce the density of small bass and maintain excellent growth and condition.

Total catch of four, 10 minute runs from Lake Hiddenwood, Walworth County, October 4, 2001

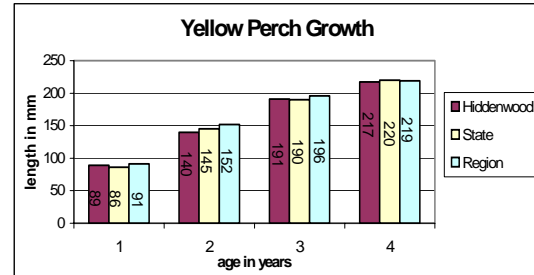
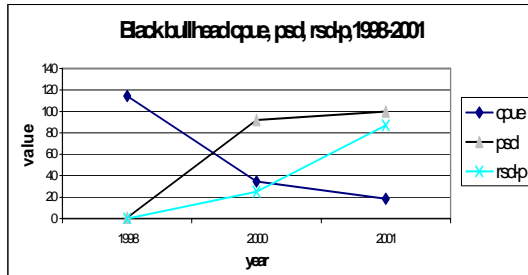
Spec.	No	%	CPUE (80%CI)	PSD (90%CI)	Stock Mean Wr (90%CI)
LMB>stock	94	100	141.0(12.4)	59(9)	112.0(0.8)



The largemouth bass population continues to improve the black bullhead quality while reducing their overall abundance. CPUE in 2001 was 18.5 fish per net. This compares to 34.7 fish per net one-year prior. PSD was 100 with an RSD-P of 87. This indicates that black bullheads are not successfully recruiting into the adult fish population. Growth is well above the state and regional average. Black crappie densities and population condition have followed the same pattern as that of the bullhead. Numbers have decreased in recent years to a CPUE of 7.7 with a PSD of 83 and an RSD-P of 1 during the 2001 survey. Recent fish sampling has showed that black crappie numbers are increasing in 2002 and 2003. This population needs to be monitored to make sure growth and condition remain at or above the state average. Yellow perch were sampled with frame nets in 2001. Though a good sample was not obtained during the survey, perch numbers are increasing and growth and condition remain good for a small impoundment.

Total catch of ten, 24 hour, 3/4-inch frame nets at Lake Hiddenwood, Walworth County, June 18, 2001.

Spec.	No	%	CPUE (80%CI)	PSD (90%CI)	Stock Mean Wr (90%CI)
BLB	185	46.3	18.5(5.0)	100(--)	82.9(0.6)
BLC	77	19.3	7.7(3.2)	97(3)	98.6(0.1)
WHS	107	26.8	10.7(2.2)	96(3)	85.2(0.7)
YEP	31	7.8	3.1(1.8)	97(6)	87.8(0.8)



MANAGEMENT GOAL

To manage the fishery at Lake Hiddenwood to maximize angler opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Maintain largemouth bass population densities at nighttime electrofishing CPUE of 70\hour and a PSD of 40 or greater with growth at or above the state average.
- Strategy 1a. Monitor largemouth bass population by means of standard survey methods to determine density, age, growth, size structure, and condition.
- Strategy 1b. Utilize as a source of largemouth bass to stock other waters if growth and condition falls to 90% of state average.
- Objective 2.** Maintain panfish PSD values between 40 and 60 with growth and condition factors at or above the state average.
- Strategy 2a. Maintain largemouth bass population at a density high enough to limit panfish recruitment and prevent overpopulation and slow growth rates.
- Strategy 2b. Monitor panfish population by means of standard survey methods to determine density, age, growth, size structure, and condition.

Objective 3. Maintain black bullhead densities with a CPUE of 20 or less.

Strategy 3a. Monitor black bullhead population using standard fish population survey methods.

Strategy 3b. Utilize Dept. crew to remove bullheads if densities get greater than a CPUE of 50.

Objective 4. Inform, receive, and use continuing input from the public and other agencies to assist in the management of Lake Hiddenwood.

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2004 and 2007 utilizing eight, 24 hour, ¾ inch frame net sets, two, 150 foot experimental gill net sets, and at least 1 hour of nighttime electrofishing to monitor all fish species.

2. Utilize as a source of largemouth bass to stock other Regional waters if electrofishing CPUE remains above 70 fish per hour and growth and condition fall below 90 % of the state average.

3. Utilize as a source of yellow perch and black crappie to stock other Regional waters if frame net CPUE rises above 50 fish per net and growth and condition fall below 90 % of the state average.

3. The local Conservation Officer and other GF&P staff should solicit input from private and public sources and provide information to the Regional Fisheries Manager on a timely basis.

4. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2009.